



University of Connecticut  
**OpenCommons@UConn**

---

Doctoral Dissertations

University of Connecticut Graduate School

---

11-9-2015

# Exclusive Breastfeeding Promotion Among HIV-infected Women: A Theory-based Approach

Emily L. Tuthill

University of Connecticut - Storrs, [emily.tuthill@uconn.edu](mailto:emily.tuthill@uconn.edu)

Follow this and additional works at: <https://opencommons.uconn.edu/dissertations>

---

## Recommended Citation

Tuthill, Emily L., "Exclusive Breastfeeding Promotion Among HIV-infected Women: A Theory-based Approach" (2015). *Doctoral Dissertations*. 960.

<https://opencommons.uconn.edu/dissertations/960>

# Exclusive Breastfeeding Promotion among HIV-Infected Women: A Theory-Based Approach

Emily L. Tuthill, PhD

University of Connecticut, 2015

In resource-limited settings, exclusive breastfeeding among HIV-infected mothers reduces infant morbidity and mortality from all causes, including HIV. Although breastfeeding by HIV-infected mothers carries a risk of HIV transmission from mother-to-child, that risk decreases from 45% to less than 5% with the practice of exclusive breastfeeding and appropriate antiretroviral therapy. The World Health Organization recommends women living with HIV exclusively breastfeed for the first 6 months of their infants life in resource-limited settings. However, exclusive breastfeeding rates remain low. This dissertation highlights infant feeding experiences among HIV-infected women in resource-limited settings and investigates a pilot intervention promoting exclusive breastfeeding in South Africa. Three distinct projects were conducted in completion of the dissertation and include, 1) a metasynthesis exploring HIV-infected women's infant feeding experience, 2) a review of existing breastfeeding self-efficacy instruments, and 3) an original study testing an Information-Motivation- and Behavioral skills-model based pilot intervention promoting exclusive breastfeeding among HIV-infected women in South Africa. Together, these three studies provide an in-depth understanding of determinants impacting HIV-infected women's ability to execute exclusive breastfeeding behavior and an innovative approach to support its practice. The overarching aim of this dissertation is to investigate innovative and practical approaches to support HIV-infected women exclusively breastfeeding behavior and increase understanding of both barriers and strategies that inhibit or enhance its practice.

Exclusive Breastfeeding Promotion among HIV-Infected Women: A Theory-Based Approach

Emily L. Tuthill

B.A., Bates College, 2003

B.S., Johns Hopkins University School of Nursing, 2007

M.S., University of Connecticut, 2014

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2015

Copyright by  
Emily L. Tuthill

2015

APPROVAL PAGE

Doctor of Philosophy Dissertation

Exclusive Breastfeeding Promotion among HIV-Infected Women: A Theory-Based Approach

Presented by

Emily L. Tuthill, M.S, RN

Major  
Advisor

Regina Cusson

Associate  
Advisor

Jeffrey Fisher

Associate  
Advisor

Jacqueline M. McGrath

University of Connecticut

2015

## Acknowledgments

I am extremely grateful to the many who have supported and believed in me over the past five years to successfully implement an interdisciplinary project- from initial idea development, to submission and funding of an NIH grant, to project execution in South Africa. I would especially like to thank my major advisor, Regina Cusson, for your unwavering support throughout my PhD program and your enthusiasm and backing in undertaking an interdisciplinary project. I am here today because of your constant guidance, expertise and mentorship throughout this journey. Thank you for believing in me and for all your support. I would also like to thank each of my committee members. Jacqueline McGrath- thank you for providing instrumental insight and perspective through the entirety of this project and for supporting me to reach for my goals. Jeffrey Fisher- thank you for working with me to write a successfully funded NIH NRSA grant. I've learned an incredible amount from your guidance and appreciate that you have challenged me to seek excellence in my writing and my research. Thank you for believing in me and for continuing to welcome my questions and conversation. Bob Gable- thank you for believing in me and providing positive, constructive feedback at every stage. Lisa Butler- your passion and commitment to positively impact children's lives is remarkable. I am grateful for the opportunity to have worked with you. Thank you for your collaboration, for sharing resources, and providing valuable guidance and insight to project implementation and for being my mentor.

A special thanks to S'the and Fiona- my two incredible research assistants who took amazing care and attention in our study because of their commitment to improve the lives of our participants. I would also like to thank the KwaZulu-Natal Department of Health, Thandanani

Children's Foundation, Sinomlando Center for Oral History and Mpumuza and Caluza clinics and their staff for your support. This project would not have been possible without the participation of our participants- thank you.

I am incredibly grateful to my family and friends. Thank you to my parents, Judy and Jeff Gove, for believing in me and always encouraging me to reach for the stars. Thank you to my siblings, Justin, Molly and Meg, and to my mother and father in-law, John and Dorise, for your positive encouragement over the years. And thank you to my husband, Noah, for supporting my every undertaking. You are my partner and sounding board- and a constant source of love- Thank you for your support every step of the way. Over the past year, as a new mother to twin boys, Theo and Rowan, my family has traveled with me to conferences, shared in the responsibilities of parenting and childcare, and have been my support network. I will always look back on this past year as a magical evolution of change, exhaustion, exhilaration, and pure joy- thank you for sharing it with me.

## TABLE OF CONTENTS

Chapter	PAGE
1 CHAPTER ONE	
1.1 Introduction	2
1.2 Overview of Dissertation Chapters	2
1.3 Conceptual Framework	9
2 Chapter TWO	20
2.1 Methods	22
2.2 Results	22
2.3 Discussion	29
2.4 Implications	30
3 Chapter THREE	32
3.1 Methods	34
3.2 Results	34
3.3 Discussion	38
4 Chapter FOUR	44
4.1 Introduction	45
4.2 Methods	48
4.3 Results	53
4.4 Discussion	54
4.5 Conclusion	58
5 Chapter FIVE	72



5.1	Background	73
5.2	Discussion of Dissertation Findings	74
5.3	Limitations	78
5.4	Conclusions	79
5.5	Implications	81

## **CHAPTER 1.**

### **INTRODUCTION**

## **Introduction**

Breastfeeding provides optimal nutrition for infants and beneficial health outcomes for their mothers (AAP, 2013; CDC, 2013). Exclusive breastfeeding (EBF) by all women (i.e., feeding only breast milk and no other foods or fluids apart from medicines) is recommended for the first 6 months (WHO, 2007) and up to two years (AAP, 2013). In resource-limited settings, EBF is also recommended for women infected with Human Immunodeficiency Virus (HIV) for the first 6 months of their infant's life (World Health Organization (WHO), 2010).

Although breastfeeding carries a small risk of HIV transmission, through EBF and antiretroviral therapy (ART) that risk decreases from 45% to less than 5% (Coovadia et al., 2007). In addition, the risk of infant morbidity and mortality from preventable causes, such as pneumonia and diarrheal diseases associated with undernutrition and formula mixed with contaminated water is greater than the small risk of contracting HIV from EBF (Rollins et al., 2007). Thus, the WHO updated its previous recommendations (i.e., 2003, 2007) to state that all HIV-infected women living in resource-limited settings EBF for the first 6 months of life (WHO, 2010). WHO infant feeding guidelines have been incorporated by National Departments of Health around the world and implemented into prevention of mother-to-child transmission (PMTCT) of HIV programs. PMTCT programs are responsible for HIV testing and treatment antenatally and infant feeding counseling. However, despite global efforts promoting EBF among HIV-infected women through PMTCT programs, it remains a rare practice. For example, in South Africa, approximately 30% of pregnant women are HIV-infected and only 8% are EBF at 6 months (South Africa Department of Health, 2008).

**Overview of Dissertation Chapters.** The purpose of this dissertation is twofold, first to gain a greater understanding of infant feeding experiences among HIV-infected women in

resource-limited settings, and second to develop and implement a pilot intervention supporting EBF among HIV-infected women in South Africa, the region of highest global HIV prevalence. Three distinct research studies were completed to fulfill the dissertation purpose and are included as chapters 2, 3 and 4, respectively. The first (i.e., Ch.2; Tuthill et al., 2014) is a metasynthesis investigating infant feeding experiences of HIV-infected women in sub-Saharan Africa. The themes that emerged highlight the challenges to successfully EBF for any amount of time, the role of motherhood in the context of HIV, and the impact of healthcare providers in infant feeding decisions.

The second study (i.e., Ch.3; Tuthill et al., 2015) is a critical review of breastfeeding self-efficacy instruments. Breastfeeding self-efficacy is a strong determinant of breastfeeding behavior and well-developed tools are needed to measure self-efficacy effectively (Wilhelm et al., 2008). Results from this review facilitated the choice of the breastfeeding self-efficacy short-form instrument (Dennis, 2003) for use in our randomized-control trial (i.e., Ch.4). Cross-cultural adaptation of our compiled instrument was completed to ensure appropriate fit within the context of our target population living in KwaZulu-Natal, South Africa (Tuthill et al., 2014b). There are multiple advantages to adapting an existing instrument, such as time and cost-savings, and the relatively fewer steps to adapt an instrument compared to developing a new one (Epstein et al., 2013). However, choosing the most appropriate existing instrument for the project is essential to ensure study constructs are effectively measured. For details related to our cross-cultural adaptation process please refer to the published manuscript (i.e., Tuthill et al., 2014b). Together the metasynthesis and instrument review each contributed to the original research study (i.e, Ch.4).

Chapter 4 constitutes the third dissertation project. This study applied a randomized control trial to test a theory-based intervention promoting EBF among well-treated HIV-infected women in South Africa. The study is supported by a NIH/NIMH NRSA F31 fellowship with additional grant support from the Eastern Nursing Research Society, American Nurses Foundation, Center for Health Intervention and Prevention, and the UConn School of Nursing. Currently, no published intervention study specifically focuses on barriers to EBF that arise through simultaneous deficits in maternal information, motivation, or behavioral skills related to EBF practices. Our aim is to address barriers to EBF among South African HIV-infected women by applying the Information, Motivation and Behavioral Skills (IMB) model as the theoretical and conceptual framework (Fisher & Fisher, 1992; 2003). Our *hypothesis* is that well-treated HIV-infected pregnant women who receive standard PMTCT of HIV counseling plus our IMB model-based pilot intervention will have increased IMB determinants influencing EBF compared to pregnant HIV-infected women who receive standard of care only.

### **Background and Significance.**

Non-EBF practice is related to increased mother-to-child transmission of HIV and increased infant mortality (UNAIDS, 2015). In 2013, approximately 240,000 children contracted HIV as a result of mother-to-child transmission of HIV, signifying global progress in the reduction of new infections (i.e., 330,000 in 2011; UNAIDS, 2013). However, additional efforts are needed to meet millennium development goals of zero vertical transmissions by the end of 2015 (UNGASS, 2011).

**Maternal, Infant, and Public Health Benefits of Exclusive Breastfeeding.** In resource-limited settings, the promotion of EBF among HIV-infected mothers is a key intervention to reduce infant morbidity and mortality from all causes, including HIV (Rollins et

al., 2009; Thior et al., 2006; Van de Perre et al., 2013). The mechanism by which EBF is associated with lower mother to child transmission of HIV is believed to be linked to increasing the immunity of the infant's gastrointestinal barrier, which is thought to be the primary site of infection (Young, 2011). Significant evidence now exists demonstrating that EBF increases HIV-free infant survival (an infant who is alive and HIV negative) in resource-limited settings through the dual benefits of reducing vertical HIV transmission and providing optimal nutrition (Engebretsen et al., 2014; Iliff et al., 2005; Sibeko, Coutsoydis, Nzuza & Gray-Donald, 2009). To reflect this, the WHO (2010) updated its infant feeding guidelines to recommend that in resource-limited settings HIV-infected mothers EBF for the first 6 months of their infant's life.

In South Africa, despite 92% of HIV-infected mothers receiving counseling promoting EBF through PMTCT programs (Ladzani et al., 2011), only 10% continue to EBF at 6 weeks post-delivery (Bland et al., 2002) and 8% continue to the recommended 6 months (Yu et al., 2014; South Africa Department of Health, 2003). Indeed, approximately half (52%) of HIV-infected mothers initiate breastfeeding within several hours of their infant's birth (Bland et al., 2002), however EBF to 6 months remains a rare practice. A disconnect exists between the current level of support promoting EBF at the clinic level and the decline in its practice postpartum.

**Background of WHO guidelines.** WHO recommendations for infant feeding among HIV-infected women living in resource limited settings have evolved since HIV was first detected in breast milk in 1985 (Thiry et al., 1985). Initially recommendations identified HIV as one of the only contraindications for breastfeeding (UNAIDS/UNICEF/WHO, 1997). With advances in science illustrating increases in infant mortality and morbidity, the WHO guidelines were updated in 2001. The new focus encouraged mothers to choose either EBF or exclusive

formula feeding, if the mother's situation to formula feed met the criteria of being acceptable, feasible, affordable, safe and sustainable as a feeding method (WHO, 2003; 2007). However, estimation by healthcare providers of whether mothers met criteria to formula feed safely proved difficult and resulted in mothers' practicing mixed-feeding methods (a combination of breastfeeding with supplemental food; water or porridge or formula; Doherty et al., 2011; Msellati & Van de Perre, 2008; Thior et al., 2006). Mixed-feeding in the first two months of life can result in a threefold increase in the risk of infant HIV transmission (Doherty et al., 2007) and a six-fold increase in death from infectious diseases (David et al., 2008). This is particularly relevant in the developing world given the lack of reliable clean drinking water to mix infant formula and paucity of acceptable cleaning supplies for bottle-feeding equipment.

**Challenges to EBF.** There has been considerable research to identify barriers preventing mothers from practicing EBF (Chisenga, Siame, Baisley, Kasonka, & Filteau, 2011; Doherty et al., 2011; Leshabari, Blystad, & Moland, 2007). Cultural norms, familial structures, misdirection from healthcare providers, and popular misconceptions (e.g., infant formula is "superior" to breast milk) are all reported barriers to EBF in both South Africa and other sub-Saharan African countries (Chopra et al., 2009; Ladzani et al., 2011). For example, mixed-feeding is the predominant infant feeding practice in South Africa where 76% of HIV-infected mothers are mix-feeding their infant by 14 weeks of age (Ghuman et al., 2009). Deviation from the mixed-feeding norm can be viewed as evidence that a mother is HIV-infected, creating an atmosphere of stigma and possible abandonment from her partner and family (Buskens, Jaffe & Mkhathshwa, 2007). Another barrier is the misconception that formula is superior to breast milk (Chisenga et al., 2011) – a misconception that may be due, in part, to South African healthcare facilities providing formula free of charge (Coutsoudis, Coovadia & Wilfert, 2008). Due to the substantial,

negative, unintended consequences from providing formula the Ministry of Health ended its disbursement to clinics in 2011 (UNICEF, 2012).

Due to increased ART efficacy and access to treatment during the antenatal and delivery period, it is estimated that half of all vertical transmissions occur postpartum through breastfeeding (UNAIDS, 2015). Therefore, effective support programs targeting EBF and medication adherence during the postpartum period are needed to reduce HIV transmissions during this time. The problem of mother-to-child transmission is especially acute in South Africa where Acquired Immune Deficiency Syndrome (AIDS) is the major cause of death in women and children in South Africa, with more than half (53%) of HIV-infected infants dying before 18 months of age (Rollins et al., 2008). In contrast, only 4% of HIV-free South African infants die before 18 months of age (Rollins et al., 2008). Increasing EBF rates and maintaining ART adherence during the postpartum period is critical to ensuring optimal infant health.

### **Conceptual Framework**

#### **Information, Motivation, Behavioral Skills Model of Health Behavior Change**

The IMB model is well-suited as the conceptual framework for our original research study (i.e., Ch.4). The IMB model provides a straightforward, theory-based framework that aims to address IMB deficits to promote behavior change. Specifically, our pilot intervention applied the IMB model with the aim of enhancing IMB breastfeeding determinants, delivered using motivational interviewing techniques in a brief one-on-one counseling session.

The IMB model of health behavioral change by Fisher and Fisher (1992) builds from the theory of planned behavior and reasoned action to foster the adaptation of HIV preventive behaviors in high-risk populations (Fisher & Fisher, 1992). It asserts that the constructs of



information and motivation work primarily through behavioral skills to influence preventive behavior (Figure 1). When applied to our target population, HIV-infected mothers who are well informed (e.g., know that EBF reduces the risk of infant death due to diarrheal diseases or that the risk of HIV transmission from mixed-feeding is extremely high if practiced before 6 months) are well motivated (possess the desire to EBF to provide their infant the best nutrition possible) are then likely to apply the necessary skills to engage in preventive behavior (EBF).

The IMB model offers direction to individual level behavioral change, including recognizing the impact of social normative support on personal motivation toward a behavior. However, should the cultural context a mother occupies be prohibitive to adopting EBF, the IMB model as a framework to behavioral change may fall short. Consequently, affecting change at the individual level through enhancing IMB breastfeeding deficits is an important area requiring support. In this way, providing HIV-infected mothers accurate knowledge, addressing their beliefs and social normative support and equipping them with the behavioral skills necessary to EBF, it is plausible that mothers may adopt EBF practice.

## **Change Theories**

Our IMB-model based pilot intervention (Ch.4) is delivered using motivational interviewing (MI) techniques. MI is a counseling strategy (Miller and Rollnick, 1991) with philosophical underpinnings grounded in change theory, specifically, the transtheoretical model (TTM).

The TTM by DiClemente & Prochaska (1985) posits that behavioral change occurs through a series of stages that require a specific task to be accomplished prior to moving on to the next stage. TTM can be applied to behavioral modification, initiation, or cessation. Through

the TTM, change is viewed as a progression from precontemplation (where the person is not considering a change), contemplation (where the person becomes aware of the behavior and evaluates a change), and preparation (where planning and commitment to change occurs; DiClemente & Prochaska, 1985). Moving through each phase results in action, and if successful, the final stage is sustained change. To optimize messaging surrounding breastfeeding IMB deficits, it is necessary to identify the TTM stage the individual occupies to tailor the appropriate IMB messages. The TTM suggests individuals in the early stages of change benefit most from its process, which can include HIV-infected mothers adopting EBF as their infant's first feeding.

### **Connecting Stages of Change with IMB**

MI effectively applies TTM concepts in a communication style to promote change behavior and is an effective delivery mode for IMB-model based interventions among HIV populations as well as non-HIV-infected populations (Fisher et al., 2014; Cornman et al., 2011). MI incorporates a brief, tailored, collaborative session with an individual/participant/client that motivates change through identifying the individual's relationship with the target behavior (stage of change) and how to move them forward. Specifically, MI aims to reduce ambivalence toward a behavior through expressing empathy, applying active listening and reflection techniques to clarify beliefs and values surrounding the behavior and to highlight areas of strong self-efficacy toward enacting the behavior (Miller & Rollnick, 1991). Multiple counseling sessions using MI techniques may be appropriate to facilitate behavioral change. However, more researchers are successfully incorporating MI into brief interventions with effective results (e.g., Cornman et al., 2011; Fisher et al., 2014; Kalichman et al., 2005).

Applying the IMB model of health behavioral change to overcome specific IMB deficits facing HIV-infected mothers in a brief one-on-one MI session is an innovative, theory-based

approach to promote EBF. Our study is limited to one MI counseling session making sustained behavioral adoption improbable, however, it may prove to be a valuable and feasible time to positively impact breastfeeding initiation and early EBF practice among HIV-infected women.

### **Final Introduction Summary**

Breastmilk is the best source of nutrients for infants with both short and long-term health benefits and is recommended for the first 6 months (CDC, 2013; WHO, 2010). However, to practice breastfeeding exclusively for 6 months requires overcoming complex challenges. Appropriate and adequate support is essential for HIV-infected women to effectively EBF. This dissertation explores the experiences of infant feeding among HIV-infected women in resource-limited settings to better understand what an appropriate and meaningful support systems might necessitate. To then develop and evaluate an innovative approach to promote EBF within a busy clinic setting.

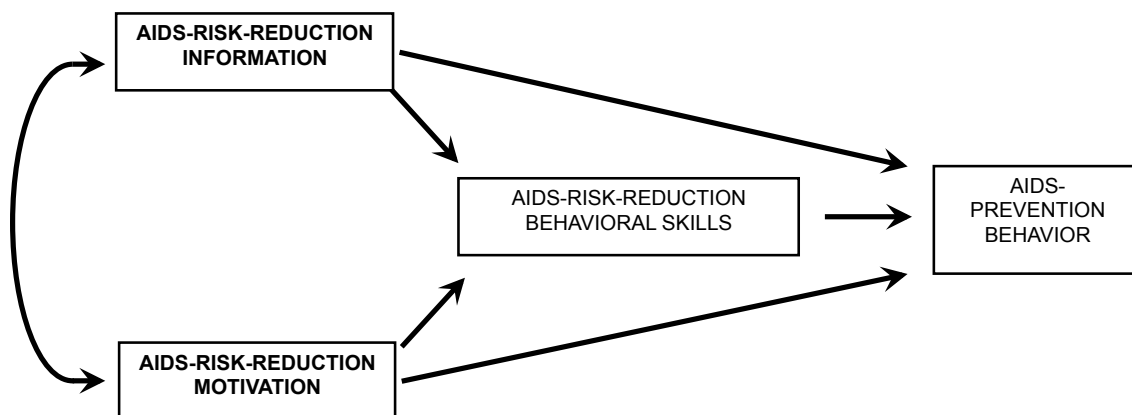


Figure 1: IMB model of health behavior change (Fisher & Fisher, 1992)

## Resources

- American Academy of Pediatrics. Breastfeeding Initiatives. Retrieved from <http://www2.aap.org/breastfeeding/>. Accessed March, 2014.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2):179–211.
- Bai, Y., Middlestadt, S., Peng, J., Fly, A. (2010). Predictors of continuation of exclusive breastfeeding for the first six months of life. *Journal of Human Lactation*, 26(1), 26-34.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychol Rev.* 84(2):191–215.
- Bland, R. M., Rollins, N. C., Coutsoydis, A., Coovadia, H. M., & Child Health Group. (2002). Breastfeeding practices in an area of high HIV prevalence in rural South Africa. *Acta Paediatrica*, 91(6), 704-711.
- Buskens, I., Jaffe, A., & Mkhathswa, H. (2007). Infant feeding practices: Realities and mindsets of mothers in southern Africa. *AIDS Care*, 19(9): 1101-1109.
- Centres for Disease Control and Prevention (2013). Breastfeeding Report Card. Retrieved from: <http://www.cdc.gov/breastfeeding/data/reportcard.htm>. Accessed
- Centres for Disease Control and Prevention. (2012). The Surgeon General's Call to Action to Support Breastfeeding. Retrieved from: <http://www.cdc.gov/breastfeeding/promotion/calltoaction.htm>. Accessed
- Chopra, M., Daviaud, E., Pattinson, R., Fonn, S., & Lawn, J. E. (2009). Saving the lives of South Africa's mothers, babies, and children: Can the health system deliver? *Lancet*, 374(9692), 835-846. doi:10.1016/S0140-6736(09)61123-5

- Chopra, M., Doherty, T., Goga, A., Jackson, D., & Persson, L. A. (2010). Survival of infants in the context of prevention of mother to child HIV transmission in South Africa. *Acta Paediatrica*, 99(5), 694-698. doi:10.1111/j.1651-2227.2009.01675.x
- Chopra, M., Doherty, T., Mehatru, S., & Tomlinson, M. (2009). Rapid assessment of infant feeding support to HIV-positive women accessing prevention of mother-to-child transmission services in Kenya, Malawi and Zambia. *Public Health Nutrition*, 12(12), 2323-2328. doi:10.1017/S1368980009005606
- Coovadia, H. M., Rollins, N. C., Bland, R. M., Little, K., Coutsooudis, A., Bennish, M. L., & Newell, M. L. (2007). Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the first 6 months of life: An intervention cohort study. *Lancet*, 369(9567), 1107-1116. doi:10.1016/S0140-6736(07)60283-9
- Cornman, D. H., Christie, S., Shepherd, L. M., MacDonald, S., Amico, K. R., Smith, L. R., . . . Fisher, J. D. (2011). Counsellor-delivered HIV risk reduction intervention addresses safer sex barriers of people living with HIV in KwaZulu-natal, South Africa. *Psychology & Health*, 26(12), 1623-1641. doi:10.1080/08870446.2011.552180
- Coutsooudis, A., Coovadia, H. M., & Wilfert, C. M. (2008). HIV, infant feeding and more perils for poor people: New WHO guidelines encourage review of formula milk policies. *Bulletin of the World Health Organization*, 86(3), 210-214.
- David, S., Abbas-Chorfa, F., Vanhems, P., Vallin, B., Iwaz, J., & Ecochard, R. (2008). Promotion of WHO feeding recommendations: A model evaluating the effects on HIV-free survival in african children. *Journal of Human Lactation : Official Journal of*

*International Lactation Consultant Association*, 24(2), 140-149.

doi:10.1177/0890334408315330

DiClemente, R., Crosby, R., & Kegler. (2009). *Emerging theories in health promotion practice and research*. San Francisco, USA: Jossey-Bass.

Doherty, T., Chopra, M., Jackson, D., Goga, A., Colvin, M., & Persson, L. A. (2007).

Effectiveness of the WHO/UNICEF guidelines on infant feeding for HIV-positive women: Results from a prospective cohort study in South Africa. *AIDS*, 21(13), 1791-1797.

doi:10.1097/QAD.0b013e32827b1462

Doherty, T., Sanders, D., Goga, A., & Jackson, D. (2011). Implications of the new WHO guidelines on HIV and infant feeding for child survival in South Africa. *Bulletin of the World Health Organization*, 89(1), 62-67. doi:10.2471/BLT.10.079798

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS risk behavior. *Psychological Bulletin*, 111, 455-474.

Fisher, W.A., & Fisher, J.D. (2003). The Information-Motivation-Behavioral Skills model: A general social psychological approach to understanding and promoting health behavior. In J. Suls & K. Wallston (Eds.), *Social psychological foundations of health*. London: Blackwell.

Gewa, C. A., Oguttu, M., & Savaglio, L. (2011). Determinants of early child-feeding practices among HIV-infected and noninfected mothers in rural Kenya. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association*, 27(3), 239-

249. doi:10.1177/0890334411403930

Ghuman, M. R., Saloojee, H., & Morris, G. (2009). Infant feeding practices in a high HIV prevalence rural district of KwaZulu-natal, South Africa. *South African Journal of Clinical Nutrition*, 22(2), 74-79.

Goga, A. E., Doherty, T., Jackson, D. J., Sanders, D., Colvin, M., Chopra, M., & Kuhn, L. (2012). Infant feeding practices at routine PMTCT sites, South Africa: Results of a prospective observational study amongst HIV exposed and unexposed infants - birth to 9 months. *International Breastfeeding Journal*, 7(1), 4. doi:10.1186/1746-4358-7-4

Horwood, C., Vermaak, K., Rollins, N., Haskins, L., Nkosi, P., & Qazi, S. (2009). Paediatric HIV management at primary care level: An evaluation of the integrated management of childhood illness (IMCI) guidelines for HIV. *BMC Pediatrics*, 9, 59. doi:10.1186/1471-2431-9-59

Iliff, P. J., Piwoz, E. G., Tavengwa, N. V., Zunguza, C. D., Marinda, E. T., Nathoo, K. J., . . . ZVITAMBO study group. (2005). Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. *AIDS (London, England)*, 19(7), 699-708.

Kalichman, S., Cain, D., Weinhardt, L., Benotsch, E., Presser, K., Zweben, A., Bjodstrup, B., Swain, G. (2005). Experimental components analysis of brief theory-based HIV/AIDS risk-reduction counseling for sexually transmitted infection patients. *Health Psychology*, 24(2):198-208.

Labbok M, Taylor E. Achieving Exclusive Breastfeeding in the United States: Findings and



- Recommendations. Washington, DC: United States Breastfeeding Committee.
2008. Retrieved: from: <http://www.usbreastfeeding.org/Portals/0/Publications/Barriers-EBF-2008-USBC.pdf>.
- Ladzani, R., Peltzer, K., Mlambo, M. G., & Phaweni, K. (2011). Infant-feeding practices and associated factors of HIV-positive mothers at Gert Sibande, South Africa. *Acta Paediatrica*, 100(4), 538-542. doi:10.1111/j.1651-2227.2010.02080.x; 10.1111/j.1651-2227.2010.02080.x
- Leshabari, S. C., Blystad, A., de Paoli, M., & Moland, K. M. (2007a). HIV and infant feeding counselling: Challenges faced by nurse-counsellors in northern Tanzania. *Human Resources for Health*, 5, 18. doi:10.1186/1478-4491-5-18
- Leshabari, S. C., Blystad, A., & Moland, K. M. (2007b). Difficult choices: Infant feeding experiences of HIV-positive mothers in northern Tanzania. *SAHARA J : Journal of Social Aspects of HIV/AIDS Research Alliance / SAHARA , Human Sciences*
- Miller, W.R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behavior*. New York: Guilford Press. *Research Council*, 4(1), 544-555.
- Misovich, S. J., Martinez, T., Fisher, J.D., Bryan, A.D., & Catapnao, N. (2003) Breast self-examination: A test of the information, motivation, and behavioral skills model. *Journal of Applied Social Psychology*, 33, 775-790.
- Rollins, N. C. (2007). Infant feeding and HIV. *BMJ (Clinical Research Ed.)*, 334(7592), 487-488. doi:10.1136/bmj.39135.411563.80
- Rollins, N. C., Becquet, R., Bland, R. M., Coutsooudis, A., Coovadia, H. M., & Newell, M. L.

- (2009). Preventing postnatal mother-to-child transmission of HIV: Context matters. *AIDS*, 23(6), 740. doi:10.1097/QAD.0b013e328327727b
- Sibeko, L., Coutsooudis, A., Nzuza, S., & Gray-Donald, K. (2009). Mothers' infant feeding experiences: Constraints and supports for optimal feeding in an HIV-impacted urban community in South Africa. *Public Health Nutrition*, 12(11), 1983-1990. doi:10.1017/S1368980009005199
- Sibeko, L., Dhansay, M. A., Charlton, K. E., Johns, T., & Gray-Donald, K. (2005). Beliefs, attitudes, and practices of breastfeeding mothers from a periurban community in South Africa. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association*, 21(1), 31-38. doi:10.1177/0890334404272388
- Sibeko, S., Baxter, C., Yende, N., Karim, Q. A., & Karim, S. S. (2011). Contraceptive choices, pregnancy rates, and outcomes in a microbicide trial. *Obstetrics and Gynecology*, 118(4), 895-904. doi:10.1097/AOG.0b013e31822be512
- Thior, I., Lockman, S., Smeaton, L. M., Shapiro, R. L., Wester, C., Heymann, S. J., . . . Mashi Study Team. (2006). Breastfeeding plus infant zidovudine prophylaxis for 6 months vs formula feeding plus infant zidovudine for 1 month to reduce mother-to-child HIV transmission in Botswana: A randomized trial: The MASHI study. *JAMA : The Journal of the American Medical Association*, 296(7), 794-805. doi:10.1001/jama.296.7.794
- Tuthill, EL., McGrath, J., Graber, M., Cusson, R., Young, SL. (2015). Breastfeeding self-efficacy: A critical review of available instruments. *Journal of Human Lactation*. DOI 10.1177/0890334415599533

- Tuthill, E., McGrath, J. & Young, S. (2014). Commonalities and Differences in Infant Feeding attitudes and practices in the Context of HIV in Sub-Saharan Africa: A metasynthesis. *AIDS Care*, 26(2): 214-225.
- Tuthill, EL., Butler, L., McGrath, J., Cusson, RM., Makiwane, G., Gable, R., Fisher, JD. (2014b). Cross-cultural adaptation of instruments assessing breastfeeding determinants: A multi-step approach. *International Breastfeeding Journal*, 9:16.
- Tylleskar, T., Jackson, D., Meda, N., Engebretsen, I. M., Chopra, M., Diallo, A. H., PROMISE-EBF Study Group. (2011). Exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): A cluster-randomised trial. *Lancet*, 378(9789), 420-427. doi:10.1016/S0140-6736(11)60738-1
- WHO. (2003). WHO/UNICEF/UNFPA/UNAIDS. HIV and infant feeding: guidelines for decision makers. (Reviewed) Geneva, Switzerland World Health Organization.
- WHO. (2007). HIV and infant feeding: New evidence and programmatic experience. Report of a technical consultation held in Geneva, Switzerland, 25-27 October, 2006. Geneva, Switzerland.
- WHO. (2010). Guidelines on HIV and infant feeding. Retrieved from:  
[http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf)
- UNGASS. (2011). UN high level meeting on AIDS. New York. Retrieved from  
<http://www.un.org/en/ga/aidsmeeting2011/>
- UNICEF. (2012). Retrieved Oct. 15, 2015 from:  
[http://www.unicef.org/health/southafrica\\_62139.html](http://www.unicef.org/health/southafrica_62139.html)
- Young, S. L., Mbuya, M. N., Chantry, C. J., Geubbels, E. P., Israel-Ballard, K., Cohan, D., . . . Latham, M. C. (2011). Current knowledge and future research on infant feeding in the

context of HIV: Basic, clinical, behavioral, and programmatic perspectives. *Advances in Nutrition*, 2(3), 225-243.

## **CHAPTER 2.**

### **Commonalities and Differences in Infant Feeding Attitudes and Practices in the context of HIV in sub-Saharan Africa: A Metasynthesis**

#### **Included with Permission from:**

Tuthill, E., McGrath, J., & Young, S. (2014). Commonalities and differences in infant feeding attitudes and practices in the context of HIV in sub-Saharan Africa: A Metasynthesis. *AIDS care*, 26(2), 214-224. Routledge Taylor & Francis Group©

## Commonalities and differences in infant feeding attitudes and practices in the context of HIV in sub-Saharan Africa: A metasyntesis

Emily Tuthill<sup>a\*</sup>, Jacqueline McGrath<sup>a</sup> and Sera Young<sup>b</sup>

<sup>a</sup>*School of Nursing, University of Connecticut, Storrs, CT, USA;* <sup>b</sup>*Division of Nutritional Sciences, Cornell University, Ithaca, NY, USA*

(Received 11 January 2013; final version received 6 June 2013)

Exclusive breastfeeding (EBF) has been identified as a key intervention to promote infant health and to reduce the vertical transmission of HIV. Despite this knowledge and increased resources to promote EBF, the practice in sub-Saharan Africa (SSA) remains low among HIV+ women. Although a number of qualitative studies have been conducted throughout SSA, the influences on and consequences of infant feeding choices of HIV+ mothers' findings have not been regarded systematically. Therefore, our objective was to identify overarching themes, commonalities, and differences in infant feeding choices among qualitative studies with HIV+ mothers in SSA. Sixteen qualitative studies of infant feeding practices in the context of HIV were identified. Noblit and Hare's seven-step metasyntesis methodology was used to analyze the experiences of HIV+ women and those who provide infant feeding services/counseling. Data were available from approximately 920 participants (i.e., 750 HIV+ mothers, 109 health-care providers, and 62 family members) across 13 SSA countries from 2000 to 2011. From these data, five themes emerged within which 3–4 overarching key metaphors were identified. The consistency of key metaphors across a variety of geographic, economic, and cultural settings suggest the importance of approaching infant feeding holistically, within the context of maternal knowledge, health-care support, family resources, and cultural expectations. EBF campaigns in SSA are more likely to successfully support optimal health for infants and a safe supportive environment for their mothers when the impact of infant feeding decisions are evaluated across these themes.

**Keywords:** breastfeeding; vertical transmission; Africa; HIV; mother-to-child transmission; metasyntesis

### Introduction

Globally, 33 million persons are living with human-immunodeficiency virus (HIV), one-third of whom live in sub-Saharan Africa (SSA; UNAIDS, 2010). In 2011, 330,000 children worldwide contracted HIV. Approximately 90% of these infections were a result of vertical transmission, which can occur intrapartum, in utero, or postpartum through breast milk (UNAIDS, 2012). In SSA, HIV disproportionately affects women and infants, who account for more than half of all HIV infections (UNAIDS, 2010).

The World Health Organization's (WHO) recommendations for infant feeding of HIV-exposed infants have continued to evolve since HIV was first detected in breast milk in 1985 (Thiry et al., 1985; Young et al., 2011). Given the risk of HIV transmission through breast milk, the use of formula was trialed and initially recommended by the WHO, UNICEF, UNFPA, and UNAIDS (2003). However, increases in infant mortality from diarrheal disease and respiratory infections resulting from improperly prepared formula and the absence of immune protective components of breast milk, the WHO guidelines were further modified. They encouraged mothers to choose either exclusive

breastfeeding (EBF) or exclusive formula feeding (EFF) if the mother's situation was such that formula feeding was acceptable, feasible, affordable, safe, and sustainable (AFASS; WHO, UNICEF, UNFPA, & UNAIDS, 2003, 2007). Assessing if AFASS criteria could be met proved difficult, which meant that many women who did not meet AFASS criteria were encouraged to EFF. The overestimate of women meeting AFASS criteria may have helped to contribute to mothers' mixed-feeding (a combination of breastfeeding with supplemental food; water, porridge, or formula before 6 months of age), which is associated with higher rates of vertical transmission and infant morbidity and mortality (Chopra, Doherty, Goga, Jackson, & Persson, 2010; Doherty, Sanders, Goga, & Jackson, 2011; Msellati & Van de Perre, 2008; Rollins et al., 2008; Thior et al., 2006).

Recommendations evolved further when it was discovered that with antiretroviral medications (ARVs), the risk of vertical transmission decreases from approximately 42% to less than 5% with the practice of EBF and ARVs (WHO, 2010). In 2010, the WHO updated its infant-feeding guidelines to recommend EBF for the infant's first 6 months

\*Corresponding author. Email: [emily.tuthill@uconn.edu](mailto:emily.tuthill@uconn.edu)

in limited-resource settings (WHO, 2010). Despite additional promotion of EBF (e.g., WHO recommendations specific to limited-resource settings, greater emphasis on health-care provider infant counseling in antenatal clinics, interventions such as Nor et al., 2011), it remains rare in SSA (Bland et al., 2008; Tylleskär et al., 2011; UNICEF, 2006). Thus we know that EBF is vital for the health of HIV-exposed infants, and that rates of EBF are low in SSA, but our understanding of why is limited. Therefore, we conducted a metasynthesis to enhance our understanding of the collective experiences of infant feeding with HIV+ mothers in SSA.

## Methods

Metasynthesis is an interpretive integration of qualitative findings of data, including phenomenological, ethnographic, grounded theory, and other interpretive or descriptive findings (Sandelowski & Barroso, 2007). The aim of a metasynthesis is to conduct a deeper investigation of extant data that results in a new interpretation of the phenomenon (Beck, 2011). The most common metasyntheses approach (Beck, 2011; Sandelowski & Barroso, 2007) involves synthesizing qualitative results across studies on a specific phenomenon (e.g., Noblit & Hare, 1988). A metasynthesis differs from a metasummary, which uses a quantitative orientated analysis of qualitative findings to explain the data (Sandelowski & Barroso, 2007). We used Noblit and Hare's (1988) methodology to inductively interpret findings across multiple qualitative studies with the aim of presenting a critical account of infant-feeding experiences in the context of HIV and to provide cross study conclusions to inform future intervention design.

Sixteen qualitative studies on infant feeding among HIV+ women in SSA were identified through online database searches, using CINAHL, Pubmed, PsychInfo, JSTOR, Proquest, and Google Scholar. Studies were included if they: (1) were qualitative, (2) included HIV+ mothers experiences infant feeding, and (3) were set in SSA. Exclusion criteria included qualitative studies whose participants' HIV status was unknown or negative and mixed-method studies (e.g., Chisenga, Siame, Baisley, Kasonka, & Filteau, 2011; Fadnes et al., 2010), as data saturation was achieved with qualitative studies alone. We limited our search to SSA due to the inordinate HIV burden there and the difficulties in generalizing findings across multiple continents. In total, 16 articles from 13 SSA countries with approximately 920 participants (i.e., 750 HIV+ mothers, 109 health-care providers, and 62 family members) were included (Table 1).

Articles spanned a range of disciplines, including anthropology, medicine, nursing, psychology, and nutrition. Researchers employed various qualitative approaches, mainly, in-depth interviews and focus groups (Table 2).

Noblit and Hare's (1988) seven-step iterative process was used to analyze the data. After choosing the phenomenon and identifying and reading texts, we determined how the studies relate with one another. In this step, *key metaphors* were extracted from each study and juxtaposed to one another. A metaphor can refer to concepts, phrases, words, or themes that synthesize the studies. Noblit and Hare (1988) identify three assumptions upon which studies may be related, i.e., reciprocally, through illustration of a line of argument or refutational/opposition. We use their first assumption, "that the accounts are directly comparable as 'reciprocal' translations". We then translated the key metaphors of each study into more general terms that fit across all studies.

## Results

The reciprocal translation of key metaphors resulted in five themes surrounding infant feeding choices and behaviors (Table 3). The themes include (1) (influence on) EBF, (2) (influence on) EFF, (3) (role of) health-care providers, (4) (role of the) family, and (5) identity as wife and mother in the context of infant feeding.

### Theme 1: Influences on EBF

The impacts from EBF fell into three key metaphors – *fear* of transmission of HIV, *cultural norms*, and *knowledge* about EBF. The primary metaphor expressed was the *fear* mothers had about the potential transmission risk from exposing their infant to HIV. Breast milk was repeatedly described as being "toxic", "bad", or "poisonous," and the fear mothers felt was evident. One mother in Malawi said, "I worry, because I am breastfeeding my baby. And I feel bad that maybe I may infect her with my HIV. And I feel that I am ruining her future and infringing on my baby's rights" (Levy, Webb, & Sellen, 2010, p. 5). In another case, an Ethiopian mother expressed this conflict as affecting her physically, "every time the baby was sucking my breasts I felt like throwing up...I thought I was breastfeeding, but I was breast-poisoning" (Koricho, Moland, & Blystad, 2010, pp. 4–6).

Furthermore, although breastfeeding is the norm in most SSA settings, EBF is rare (Rollins et al., 2008). Thus, the decision to EBF was also a shift in cultural and social norms, which had major implications if family involvement in childcare was high.

Table 1. Demographic information from each individual study included in metasynthesis.

Author and year	Country	Sample size	Age of participants	Participants' pregnancy status at data collection	Dates of data collection
Buskens et al. (2007)	Namibia, Swaziland, South Africa	155 mothers, 31 relatives, 92 health workers, 7 traditional healers, total – 285	Not specified	Pregnant women and postpartum: <1 year	2003
Cames et al. (2010)	Burkina Faso	51 mothers	Not specified	Postpartum: 1–5 months	2006
de Paoli, Mkwanzai, Richter, and Rollins (2008)	South Africa	16 mothers	20–29	Postpartum: 4–7 months	2005
Desclaux and Alfieri (2009)	Burkina Faso, Cambodia, Cameroon	Burkina Faso – 85, Cambodia – 80, Cameroon – 65, total – 230 mothers	Not specified	Not specified	Burkina Faso 2002–2007, Cambodia 2002–2004, Cameroon 2002–2007
Doherty, Chopra, Nkonki, Jackson, and Persson (2006)	South Africa	27 mothers	25	Interviewed once prenatally and once postpartum	2004–2005
Doherty et al. (2006)	South Africa	40 mothers	24	Postpartum: mean infant age 8 months	2004
Koricho (2008)	Ethiopia	14 mothers breastfeeding, 8 mothers formula feeding, 10 health-care providers, total – 32	Not specified	Postpartum: <1 yr	2007
Koricho et al. (2010)	Ethiopia	22 mothers	Not specified	Not specified	2007
Leshabari et al. (2007)	Tanzania	22 mothers	Not specified	Antenatal: 36 wks	2003–2004
Levy et al. (2010)	Malawi	55 mothers	18–33	Prenatal and postpartum	2004–2005
Ostergaard and Bula (2010)	Malawi	21 mothers	18–40	Postpartum, infants 7–12 months	2008–2009
Maman et al. (2011)	Democratic Republic of Congo	40 pregnant women and mothers	Not specified	Prenatal and postpartum	2006
Ramara et al. (2010)	South Africa	10 mothers	Not specified	Postpartum	Not specified
Seidel et al. (2000)	South Africa	2 focus group sessions with mothers	Not specified	Not specified	Not specified
Sibeko et al. (2009)	South Africa	31 mothers	25	Mothers of young infants	2004–2005
Thairu, Pelto, Rollins, Bland, and Ntshangase (2005)	South Africa	22 mothers	26	Postpartum: <6 months	2002



Table 2. Methodological characteristics of the qualitative studies included in the metasynthesis.

Author	Primary discipline of authors	Qualitative research design <sup>a</sup>	Data collection	Data analysis	PMTCT counseling delivered
Buskens et al.	Anthropology	In-depth qualitative research	Interviews	Conceptual framework analysis (Ritchie & Spencer, 1994)	Not specified
Cames et al.	Not specified	Qualitative study	Focus group discussions	Interpretive approach into exhaustive categories (Krueger & Casey, 2009)	Not specified
de Paoli et al.	Medicine	Qualitative study	Semistructured in-depth interviews	Grounded theory (Strauss & Corbin, 1998)	Some
Desclaux and Alfieri I	Anthropology	Qualitative study	Interviews; ethnographic observations	Comparative analysis of transversal items	Yes
Doherty, Chopra, Nkonki, Jackson, and Persson	Medicine	Longitudinal qualitative interview study	Open-ended interviews	Thematic content method	Yes
Doherty, Chopra, Nkonki, Jackson, and Greiner	Medicine	Qualitative interview study	Interviews; one focus group discussion	Interpretative approach for key categories and recurring themes	Yes
Koricho	International health	Qualitative study	Qualitative triangulation using in-depth interviews; observation	Pope and Mays (2006)	Not specified
Koricho et al.	Public health	Qualitative interpretive study	Interviews	Qualitative triangulation methods; themes	Not specified
Leshabari et al.	Nursing	Exploratory descriptive	Observation; in-depth interviews	Not specified	Yes
Levy et al.	Anthropology	Ethnographic	Observation; semistructured interviews; focus group discussions; key informant interviews	Themes	Yes
Ostergaard and Bula	International health, immunology and microbiology	Qualitative study	Observation; in-depth interviews	Thematic approach	Yes
Maman et al.	Health behavior	Qualitative study	In-depth interviews	Themes	Not specified
Ramara et al.	Nursing	Phenomenological	In-depth unstructured interviews	Lived experience repeating themes	Not specified
Seidel et al.	Social work	Qualitative investigation	In-depth discussions	Ethnographic	Not specified
Sibeko et al.	Nutrition	Qualitative study	In-depth interviews; observations	Patton's general interview guide (2002)	Not specified
Thairu et al.	Nutrition	Ethnographic study	Exploratory interviewing; ethnographic interviews	Conversation analysis	Not specified

Notes: <sup>a</sup>Study design, data collection techniques, and analysis are stated based on the authors' terminology. For example, if the author wrote that they used "in-depth interviews" it is stated as such. Likewise, if the author stated a specific methodologist for their data analysis, it is listed; otherwise, the methods as described by the authors are included. If those details were not provided and simply the outcome was stated that is what is included in the table.

Table 3. Key metaphors from each study as related to the overarching themes.

	Theme 1: Influences on EBF	Theme 2: Influences on EFF	Theme 3: Role of health-care providers	Theme 4: Role of the family	Theme 5: Identity as wife and mother in the context of infant feeding
Overarching metaphors	Fear of transmission  Cultural norms Knowledge	Child health  Stigma Cost	Influence  Confusion Trust Gratitude/judgment	Support  Disclosure Truth	BF is hallmark  Self-efficacy Disclosure Mistreatment
<i>Study<sup>a</sup></i>					
Buskens et al. (2007)	“Suspicion.” “Breast milk alone not enough for infant.” “Infants can’t survive without water.”	“Suspicion.” “Making excuses.” “Means to choose.”	“Throw away baby’s life.” “[Health-care provider] Not highly regarded.”	Infant raised by family. Not only the mother’s child, but the whole family. “Mother or grandmother first to notice infant problems.”	“Give up motherhood to save infant”. “Alone”. “BF is form of communication with baby.”
Cames et al. (2010)	Worried about transmission. Choose EBF b/c of “Fear.” “Default choice.” “Normative beliefs.”	“Negative reactions.” “Stigma.” “Opposition from family.” “Forced to abandon EFF.” Top priority. Support is Key. “With formula you stay calm.” “Disclosure necessary to success.”	“Gratitude” from mothers. “Dependence on relationship.”	“Family very involved.” Positive support critical.	Social implications from not BF. “Responsible.” “Stigma.” “What’s optimal?”
de Paoli et al. (2008)	“Guilt at risking transmission.” “Social norms.” “Infant crying.”	“Not giving child love.” “Guilt.” “Stole the breast.”  “Avoid infection at all costs”. “Safety for child”.	Limited practical advice. “Cold, rainy or sunny-stop BF [health-care provider on excuses mothers make].” “Judgmental.” “Coercive.” “We [health-care provider] make choice for them.”	“Had to persist against family.”	“Loneliness.” “Despair.”
Desclaux and Alfieri (2009)	“Fear of transmission.” “BF highly valued.” HIV infected milk is “Bad milk.”	“Cost.” “Explain yourself.” Social pressure.	“Counsel until mother accepts our opinion.” “BF is forbidden.”	“Rely on financial support.” Support from husbands varied. Family situation allows mothers to “choose.”	“Alone.” Alliance to husband threatened. “Stigma.”
Doherty, Chopra, Nkonki, Jackson, and Persson (2006)	“Need support.” Fear of negative consequences from unintended disclosure. “Forced to choose because of HIV.” “Insufficient milk production.”	Worried about unintended disclosure. “Death from respiratory illness.” “Cost.” “Free formula.”	“Conflicting messages.” Counseling.	“Persistent.”	“Couldn’t do the right thing for baby, scared for self.” “Personal beliefs.” “Critical time in life.”

Table 3 (Continued)

	Theme 1: Influences on EBF	Theme 2: Influences on EFF	Theme 3: Role of health-care providers	Theme 4: Role of the family	Theme 5: Identity as wife and mother in the context of infant feeding
Doherty, Chopra, Nkonki, Jackson, and Greiner (2006)	"Fear of transmission." Self-efficacy threatened. "Bad milk." "Insufficient milk."	"Everyone knows the tin." "Struggle for access." "Excuses." "Stigma with formula." "Ridiculed." "Scorned." "Desire to protect." Free formula.	"Forced." "Overestimated risk of breastfeeding." "Greatest influence." "Power, authority." Power between health worker and client.	"Financial support." "Fear of disclosure." "Hiding the truth."	"Breast milk is best, but must formula feed." "Social isolation." "Despair." "Powerlessness." "Hide away." Disbelief in abilities to care for baby. "Hidden truths."
Koricho (2008)	"Fear of breast milk." "Had to change decision." "Cursing myself." "Sinful."	"No savings to buy tin milk." "Disclosure." "To survive and live, you lie."	"Fear of what to tell mothers". Conflicting messages. "(mothers) Fear of breast milk."		"Can't be a mother." Divorce linked to disclosure. "Bad mother." "Beg on street for money." "I will be punished." "I almost killed." "I poisoned my baby." "No peace." "What can I give?" "Darkest moment of my life." "Will God give a second chance?" "NO choice." "Sinful mother." "Helpless." "BF only natural way to feed." "BF equivalent to knowingly killing your baby."
Koricho et al. (2010)	"Fear of breast milk." "Difficult to live with decision." "Felt like throwing up." "Offense against God." "Crime." "Inflicts harm." "Killing an infant."	"Social pressure." "No excuses."	"Nurse screamed." "Buy cow's milk." "Negative attitude towards BF."		
Leshabari et al. (2007)	"Disclosure." "Stress." "Obsessed with danger of transmitting to infant." "EBF is alien."	"Lying". "Rumored to be having an affair." "Family pressure." "Infant constipation." "Gossiping." "Costly."		"Pressure." "Family support critical." "Won't accept daughter-in-law who doesn't breastfeed."	"Guilt." "A real mother breastfeeds." "Social pressure to BF." "Severe hardship." "Self-determination." Intentions vs Actions. "Stigma." "Perception of having an affair if not breastfeeding." "Baby needs water."
Levy et al. (2010)	"Baby has a right to grow up." "Worry." "Frustration." "Gripe water relieves pain." "Water not in conflict with EBF."	"Social pressure." "Cost."	"Just tell mothers what to do, don't give them the information."		"Baby suffers with early weaning." "Feel bad if baby is infected." "Cultural norms." "Stigma."

Table 3 (Continued)

	Theme 1: Influences on EBF	Theme 2: Influences on EFF	Theme 3: Role of health-care providers	Theme 4: Role of the family	Theme 5: Identity as wife and mother in the context of infant feeding
Maman et al. (2011)	"Fear of infection." "Breast milk unfit for consumption." "Milk insufficiency." "Lack money to feed myself, no milk."	"No money to buy boxes of milk." "Best for infant."	"Medical staff showed me how to breastfeed."	Family support helped maintain formula feeding.	
Ostergaard and Bula (2010)	"Social." "Looked at as wanting to kill baby by others." "Can't mixed feed-more dangerous." "Fear of transmission." "Gripe water acceptable with EBF." "Breast milk is toxic."		"Poor quality in groups."	"Power" of mother-in-laws. Feeding decisions made by grandmother.	"Alone, husband left me." "Disclosure." "Secrets." "Fear." "What if baby starts crying?" Must feel empowered. "Poisoning child."
Ramara et al. (2010)	EBF uncommon. "Okay to provide water with EBF."	Not enough "tins." Difficult to clean bottles. "Stressful." "Free formula." "Require social grant to buy formula."	Didn't give enough formula.	"Rely on family for financial support." Infant feeding support critical to follow through.	"What will happen?" Cultural norms.
Seidel et al. (2000)	"Sores in babies' mouth from EBF." "Breast milk was watery."	"I was beaten." "Boyfriend said I wanted to look younger." "Baby had diarrhea, he died." "Breaks the bond." "No access to formula."	"Insist on BF." "Conflicting messages." "Tins were made unavailable."		"Motherhood is threatened by HIV." BF is norm. "Can't deviate from norm."
Sibeko et al. (2009)	"Fear of infecting infant with this sickness." "Baby not full from breast milk."	"Hide feeding from relatives." Arouse suspicion. "Unavailable." "Pressure to formula feed." "Free formula."	"Coercive."		"Had to mix-feed." "Bear all responsibility." "What to do?" "Anxiety." "Stigma." "Disclosure."
Thairu et al. (2005)	"Must EBF, can't mix-feed." Anxiety of making baby unhealthy.	"[formula feeding] Equivalent to announcing HIV status." "Tins are costly." Poverty constrains choice.	Stigmatize mothers. "Don't understand."	"Older people at home want to see infant eating." Economic circumstances influence decision.	"Isolated." "I am sick." "Stigma." "Social disapprobation." "Disclosure."

Notes: <sup>a</sup>Quotes are used whenever possible to represent key metaphors. Short phrases may also be used as a key metaphor as a direct interpretation from the article.

A mother from Burkina Faso stated, “in the compound, they prepare *dolo* (fermented drink), if I leave here, even a moment, they will give her [infant] a drink” (Cames et al., 2010, p. 254).

One of the difficulties of EBF is an incorrect understanding of the definition. Lack of knowledge defining EBF resulted in mothers mix-feeding while believing they were practicing EBF. The most common example seen was through feeding gripe water (a water-based mixture used to treat colic, dehydration, and gastrointestinal distress), as seen through this Malawian mothers words, “I managed to practice exclusive breastfeeding for 6 months and only gave gripe water when my baby was crying a lot due to stomach pain” (Ostergaard & Bula, 2010, p. 217).

Additionally, key metaphors regarding milk insufficiency were present. Mothers who regarded their milk production lacking due to personal hunger, personal emotions, or breast milk being inadequate for optimal nutrition, feared their infant was not being adequately fed. A Swazi mother stated, “she was not getting enough from breastfeeding. There was not enough milk when I was hungry” (Buskens, Jaffe, & Mkhathswa, 2007, p. 1104).

### Theme 2: Influences on EFF

Unlike in resource-rich settings where water quality, cost, and availability of formula are accessible for most HIV+ mothers, women in resource-limited settings met unforeseen repercussions from formula use. Three key metaphors comprise this theme, *child health*, *stigma*, and *cost*. *Child health* was described well by one nurse from South Africa, “First we were happy with the free formula because we thought our problems with the infected mothers were over... But now we see it... is a lot of trouble for the baby... diarrhea, sickness and not growing well” (Sibeko, Coutoudis, Nzuza, & Gray-Donald, 2009, p. 1987). Many mothers reported increased illness in their infant as seen through this Malawian mothers quote, “I did not breastfeed my baby, but she had diarrhea for a full three months” (Seidel, Sewpaul, & Dano, 2000, p. 28).

Women experienced *stigma* from their communities. Because breastfeeding is the cultural norm, formula feeding can be a sign to a woman’s family or community that she is HIV+. One South African mother said, “...when they see me coming with the tins [formula] they laugh at me, they say I have HIV and I tell the I do not have AIDS... and I hide the tins” (Doherty, Chopra, Nkonki, Jackson, & Greiner, 2006, p. 94).

The *cost* and availability of formula also proved to be a barrier for mothers. A South African mother states, “Milk get finished when I don’t have money to buy extra tin for my child and I do feel that it is better to breastfeed” (Ramara, Maputle, & Lekhuleni, 2010, p. 11) and, “the nurses at the clinic sometimes tell us they have no milk to give us” (Sibeko et al., 2009, p. 1986).

### Theme 3: Role of the health-care provider

The impact health-care provider messages had on mothers were apparent. The key metaphors within this theme centered on the *influence* health-care providers have and whether that translated into *gratitude* by mothers or feeling *judged*. Another key metaphor that emerged was the *confusion* health-care providers expressed in regards to changing WHO recommendations and their concern for losing mothers *trust* because of the changing messages. An Ethiopian health-care provider’s sentiment towards messaging is reflected well:

I am really hoping that the new recommendation [WHO, 2010] is only for discussion; not for actual practice. How can we tell these mothers? They have been told repeatedly about the risk of HIV transmission through breastfeeding, and now all of a sudden breastfeeding is ‘good’ again. Do you think they are going to trust us anymore? (Koricho, 2008, p. 63)

Changing messages have led to increased confusion and mistrust.

A trusting relationship between health-care provider and mother is critical to impart lasting change. However, *trust* cannot be assumed, as stated by this Namibian mother, “they talk what they know... we in the community have our ways” (Buskens et al., 2007, p. 1105). The approach of a health-care provider in counseling makes a substantial difference in the sense of *gratitude* and *trust* mothers have in their provider. A mother from Burkina Faso reflects a sentiment of feeling *judged* or unsupported:

When I said I wanted to breastfeed, they [health care provider] said at the hospital: “your child’s going to die if you breastfeed. You’ll contaminate him. The risk is too high. You must give formula”. Did I have a choice? I gave formula. (Desclaux & Alfieri, 2009, p. 824)

Conversely, supportive counseling can leave mothers with a sense of *gratitude* as expressed by this Ethiopian mother, “When I asked the nurse whether I was the only one breastfeeding or not, she told me that there were many other mothers who were

breastfeeding. I don't feel loneliness" (Koricho, 2008, p. 62).

#### **Theme 4: Role of the family**

Mothers who were able to execute their decisions more successfully often had the support of their husband or family. *Support* was the major metaphor, as seen through this Congolese mothers quote, "It was just me, my husband and my mother who said, as soon as you deliver, you must not give your infant breast milk" (Maman et al., 2011, p. 262).

Other metaphors reflective of the family role were *disclosure* and *truth*. Many mothers hid the truth from family fearing disclosure. In Ethiopia:

I told them [family] I was bottle feeding her because my breasts did not have enough milk. My elder sister... came with warm water, and started massaging my breasts... I had nothing to say, and had to do what she told me to do... I was praying to God so that she [baby] would not be able to suck. (Koricho et al., 2010, p. 5)

In South Africa: "my mother asked me why I did not breastfeed. I told her... I have a problem with my breast" (Doherty et al., 2006).

Positive family *support* provided the safety-net mothers needed to carry out their infant-feeding decisions. However, fear of *disclosure* to family is real for some mothers, as seen by the repercussion of this Malawian mother, "I disclosed my status to my husband and since he did not want me to have the test, immediately he started shouting at me as a prostitute who did not respect him... then he left me" (Ostergaard & Bula, 2010, p. 216).

#### **Theme 5: Identity as wife and mother in the context of infant feeding**

*Breastfeeding* was perceived to be fundamental to motherhood. A Tanzanian mother said, "A real mother should breastfeed her child" (Leshabari, Blystad, & Moland, 2007, p. 551), and a mother from Soweto, "when you breastfeed you communicate with the baby. When the baby looks at you, you will normally say I love you even if you don't say it in words but in your heart" (Buskens et al., 2007, p. 1104).

A lack of self-efficacy was present throughout the studies, as seen in the following quote by a South African mother; "but now I don't know what to do because I did not want to give this sickness [HIV] to my child, but my mother and the father would ask me why I was not breastfeeding this child" (Sibeko et al.,

2009, p. 1986). Perceptions of being a "bad mother" for not attending to their child in typical ways was also evident, as reflected by this Malawian mother:

if you go to social gatherings and your baby start crying they start insulting you. "Why are you not breastfeeding your child? Is it yours or have you stolen from someone?" it is very difficult to stop breastfeeding at this age. (Ostergaard & Bula, 2010, p. 218)

or reflected by this Ethiopian mother, "To survive and live you lie. What else can you do? You build your fence with piles of lies" (Koricho, 2008, p. 52).

### **Discussion**

A collective picture of infant feeding as experienced by HIV+ mothers emerged through analysis of data from 13 SSA countries. More similarities than differences were evident throughout each theme (Table 3). For example, across studies, the influences on EBF centered on HIV+ mothers' fear of transmitting HIV to her infant. The major barriers to EFF included stigma and disclosure as well as the logistical consideration of cost.

We also found that in most studies, for a woman to be able to successfully EBF and EFF, health-care providers and family were pivotal. Specifically, the importance of relaying accurate messages to mothers regarding EBF definitions and the risk of transmission for each modality of feeding was influential for optimal infant feeding outcomes. In addition, although it cannot fall on health-care providers alone to solve the issue of stigma, it is in their capacity to support mothers in formulating strategies that equip her with the skills to confront it. In both cases (i.e., EFF and EBF), health-care providers are well positioned to support mothers in enhancing their self-efficacy through improving maternal information regarding HIV and infant feeding and through building strategies to navigate known barriers (e.g., stigma). Likewise, they are in a position to help facilitate conversations around disclosure in a safe and controlled environment by including family members in care. Finally, a supportive family enables a mother to carry out her infant feeding decision.

The failure of family members or health-care providers to support HIV+ mothers in executing a decision to EBF or EFF typically resulted in the adoption of mixed-feeding. Conversely, those mothers who were well supported and able to disclose their status to a supportive family unit were more likely to successfully carry out their initial infant feeding decision.



The themes identified also revealed how an HIV+ mother's decision to either EBF or EFF are actually both in conflict with concepts of ideal motherhood. An HIV+ mother who practices EBF fears transmission risk and putting her infant's safety and underfeeding in question, however, if EFF, the signature behavior of a mother (i.e., breastfeeding) is eliminated altogether. Acknowledging this dilemma is important to providing HIV+ mothers the skills they need to enhance their self-efficacy and execute optimal infant feeding.

Strikingly, there were not major differences in mothers' experiences of infant feeding across SSA studies. The main difference found among these studies was the greater exposure South African mothers had to EFF as an option. This may be due, in part, due to South Africa offering formula free of charge as their National Policy and thus creating an environment where EFF was more likely to be part of an HIV+ mother's experience.

### Implications for the field and future research

The many parallel experiences of HIV+ mothers across these 16 qualitative studies in SSA suggest the salience of the five themes and their key metaphors to the implementation of infant feeding campaigns (Table 3). Efforts to improve self-efficacy through supportive health-care provider relationships that equip mothers' with the resources to overcome stigma and fear while simultaneously upholding an authentic tie to concepts of motherhood are important. Given that health-care providers have been the identified link between global efforts to eliminate vertical transmission and direct care (WHO, 2010), increased support is needed to provide them with the means to effectively support HIV+ mothers. Finally, the inclusion of families and communities in infant feeding interventions seems likely to help mothers to feed their infant in the safest way for their particular circumstances. EBF campaigns in SSA are more likely to successfully support optimal health for infants and a safe supportive environment for their mothers when infant feeding consequences are evaluated holistically within the context of maternal knowledge, health-care support, family resources, and cultural expectations.

### Acknowledgements

The project described was supported by Grant Number F31MH099990 from the National Institute of Mental Health. The content is solely the responsibility of the authors and does not necessarily represent the official views

of the National Institute of Mental Health or the National Institutes of Health.

### References

- Beck, C. T. (2011). A metaethnography of traumatic childbirth and its aftermath: Amplifying causal loop. *Qualitative Health Research*, 21, 301–311.
- Bland, R. M., Little, K. E., Coovadia, H. M., Coutoudis, A., Rollins, N. C., & Newell, M.-L. (2008). Intervention to promote exclusive breast-feeding for the first 6 months of life in a high HIV prevalence area. *AIDS*, 22, 883–891. doi:[10.1097/QAD.0b013e3282f768de](https://doi.org/10.1097/QAD.0b013e3282f768de)
- Buskens, I., Jaffe, A., & Mkhathswa, H. (2007). Infant feeding practices: Realities and mind sets of mothers in southern Africa. *AIDS Care*, 19, 1101–1109. doi:[10.1080/09540120701336400](https://doi.org/10.1080/09540120701336400)
- Cames, C., Saher, A., Ayassou, K. A., Cournil, A., Meda, N., & Simondon, K. B. (2010). Acceptability and feasibility of infant-feeding options: Experiences of HIV-infected mothers in the world health organization Kesho Bora mother-to-child transmission prevention (PMTCT) trial in Burkina Faso. *Maternal & Child Nutrition*, 6, 253–265.
- Chisenga, M., Siame, J., Baisley, K., Kasonka, L., & Filteau, S. (2011). Determinants of infant feeding choices by Zambian mothers: A mixed quantitative and qualitative study. *Maternal & Child Nutrition*, 7, 148–159. doi:[10.1111/j.1740-8709.2010.00264.x](https://doi.org/10.1111/j.1740-8709.2010.00264.x)
- Chopra, M., Doherty, T., Goga, A., Jackson, D., & Persson, L. A. (2010). Survival of infants in the context of prevention of mother to child HIV transmission in South Africa. *Acta Paediatrica*, 99, 694–698.
- de Paoli, M. M., Mkwana, N. B., Richter, L. M., & Rollins, N. (2008). Early cessation of breastfeeding to prevent postnatal transmission of HIV: A recommendation in need of guidance. *Acta Paediatrica*, 97, 1663–1668. doi:[10.1111/j.1651-2227.2008.00956.x](https://doi.org/10.1111/j.1651-2227.2008.00956.x)
- Desclaux, A., & Alfieri, C. (2009). Counseling and choosing between infant-feeding options: Overall limits and local interpretations by health care providers and women living with HIV in resource-poor countries (Burkina Faso, Cambodia, Cameroon). *Social Science & Medicine*, 69, 821–829. doi:[10.1016/j.socscimed.2009.06.007](https://doi.org/10.1016/j.socscimed.2009.06.007)
- Doherty, T., Chopra, M., Nkonki, L., Jackson, D., & Greiner, T. (2006). Effect of the HIV epidemic on infant feeding in South Africa: “When they see me coming with the tins they laugh at me”. *Bulletin of the World Health Organization*, 84(2), 90–96. doi:[10.2471/BLT.04.019448](https://doi.org/10.2471/BLT.04.019448)
- Doherty, T., Chopra, M., Nkonki, L., Jackson, D., & Persson, L. A. (2006). A longitudinal qualitative study of infant-feeding decision making and practices among HIV-positive women in South Africa. *The Journal of Nutrition*, 136, 2421–2426.
- Doherty, T., Sanders, D., Goga, A., & Jackson, D. (2011). Implications of the new WHO guidelines on HIV and infant feeding for child survival in South Africa.

- Bulletin of the World Health Organization*, 89(1), 62–67. doi:[10.2471/BLT.10.079798](https://doi.org/10.2471/BLT.10.079798)
- Fadnes, L. T., Engebretsen, I. M., Moland, K. M., Nankunda, J., Tumwine, J. K., & Tylleskar, T. (2010). Infant feeding counselling in Uganda in a changing environment with focus on the general population and HIV-positive mothers – A mixed method approach. *BMC Health Services Research*, 10, 260. doi:[10.1186/1472-6963-10-260](https://doi.org/10.1186/1472-6963-10-260)
- Koricho, A. T. (2008). *The fear of mother's milk in the era of HIV: A qualitative study among HIV positive mothers and health professionals, Addis Ababa, Ethiopia* (Master's thesis). University of Bergen, Norway.
- Koricho, A. T., Moland, K. M., & Blystad, A. (2010). Poisonous milk and sinful mothers: The changing meaning of breastfeeding in the wake of the HIV epidemic in Addis Ababa, Ethiopia. *International Breastfeeding Journal*, 5(1), 12. doi:[10.1186/1746-4358-5-12](https://doi.org/10.1186/1746-4358-5-12)
- Krueger, R. A., & Casey, M. A. (2009). *Focus groups: A practical guide for applied research*. Newbury Park: Sage.
- Leshabari, S. C., Blystad, A., & Moland, K. M. (2007). Difficult choices: Infant feeding experiences of HIV-positive mothers in northern Tanzania. *Journal of Social Aspects of HIV/AIDS Research Alliance/SAHARA, Human Sciences Research Council*, 4, 544–555. doi:[10.1080/17290376.2007.9724816](https://doi.org/10.1080/17290376.2007.9724816)
- Levy, J. M., Webb, A. L., & Sellen, D. W. (2010). “On our own, we can't manage”: Experiences with infant feeding recommendations among Malawian mothers living with HIV. *International Breastfeeding Journal*, 5, 15. doi:[10.1186/1746-4358-5-15](https://doi.org/10.1186/1746-4358-5-15)
- Maman, S., Cathcart, R., Burkhardt, G., Omba, S., Thompson, D., & Behets, F. (2011). The infant feeding choices and experiences of women living with HIV in Kinshasa, Democratic Republic of Congo. *AIDS Care*, 24, 1–7. doi:[10.1080/09540121.2011.597708](https://doi.org/10.1080/09540121.2011.597708)
- Msellati, P., & Van de Perre, P. (2008). Maternal HIV infection and infant feeding: Support is the key. *AIDS*, 22, 2391–2392.
- Noblit, G. W., & Hare, R. D. (1988). *Meta-ethnography: Synthesizing qualitative studies*. Newbury Park, CA: Sage.
- Nor, B., Ahlberg, B. M., Doherty, T., Zembe, Y., Jackson, D., Ekstrom, E. C., & for the PROMISE-EBF Study Group. (2011). Mother's perceptions and experiences of infant feeding within a community-based peer counseling intervention in South Africa. *Maternal & Child Nutrition*, 8, 448–458.
- Ostergaard, L. R., & Bula, A. (2010). “They call our children ‘nevirapine babies?’”: A qualitative study about exclusive breastfeeding among HIV positive mothers in Malawi. *African Journal of Reproductive Health*, 14, 213–222.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Thousand Oaks, CA: Sage.
- Pope, C., & Mays, N. (2006). *Qualitative research in health care*. Massachusetts: Blackwell Publishing.
- Ramara, N. S., Maputle, M. S., & Lekhuleni, M. E. (2010). Infant feeding and HIV positive mothers in the Capricorn district of Limpopo province. *Curationis*, 33(1), 5–16.
- Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research. In A. Bryman & R. G. Burgess (Eds.), *Analysing qualitative data* (pp. 173–194). London: Routledge.
- Rollins, N. C., Becquet, R., Bland, R. M., Coutoudis, A., Coovadia, H. M., & Newell, M. L. (2008). Infant feeding, HIV transmission and mortality at 18 months: The need for appropriate choices by mothers and prioritization within programmes. *AIDS*, 22, 2349–2357.
- Sandelowski, M., & Barroso, J. (2007). *Handbook for synthesizing qualitative research*. New York, NY: Springer.
- Seidel, G., Sewpaul, V., & Dano, B. (2000). Experiences of breastfeeding and vulnerability among a group of HIV-positive women in Durban, South Africa. *Health Policy and Planning*, 15(1), 24–33.
- Sibeko, L., Coutoudis, A., Nzuza, S., & Gray-Donald, K. (2009). Mothers' infant feeding experiences: Constraints and supports for optimal feeding in an HIV-impacted urban community in South Africa. *Public Health Nutrition*, 12, 1983–1990.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research. Techniques and procedures for developing grounded theory*, 2nd ed. Thousand Oaks, CA: Sage.
- Thairu, L. N., Pelto, G. H., Rollins, N. C., Bland, R. M., & Ntshangase, N. (2005). Sociocultural influences on infant feeding decisions among HIV-infected women in rural Kwa-Zulu Natal, South Africa. *Maternal & Child Nutrition*, 1(1), 2–10.
- Thior, I., Lockman, S., Smeaton, L. M., Shapiro, R. L., Wester, C., Heymann, S. J., ... Mashi Study Team. (2006). Breastfeeding plus infant zidovudine prophylaxis for 6 months vs formula feeding plus infant zidovudine for 1 month to reduce mother-to-child HIV transmission in Botswana: A randomized trial: The Mashi study. *The Journal of the American Medical Association*, 296, 794–805.
- Thiry, L., Sprecher-Goldberger, T., Jonckheer, T., Levy, J., Van De Perre P., Henrivaux, P., ... Clumeck, N. (1985). Isolation of AIDS virus from cell-free breast milk of three healthy virus carriers. *The Lancet*, 326, 891–892.
- Tylleskär, T., Jackson, D., Meda, N., Engebretsen, I. M., Chopra, M., Diallo, A. H., ... PROMISE-EBF Study Group. (2011). Exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): A cluster-randomised trial. *The Lancet*, 378, 420–427.
- WHO, UNICEF, UNFPA, & UNAIDS. (2003). *HIV and infant feeding: Guidelines for decision makers*. (Reviewed) Geneva: World Health Organization.
- WHO, UNICEF, UNFPA, & UNAIDS. (2007). *HIV and infant feeding: New evidence and programmatic experience*. Report of a technical consultation held on behalf of the Inter-agency Task Team (IATT) on



- Prevention of HIV infections in pregnant women, Mother and their Infants, 25–27 October 2006. Geneva, Switzerland.
- WHO. (2010). *Guidelines on HIV and infant feeding*. Retrieved from [http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf)
- UNAIDS. (2010). *UNAIDS report on the global AIDS epidemic*. Retrieved from [http://www.unaids.org/globalreport/documents/20101123\\_GlobalReport\\_full\\_en.pdf](http://www.unaids.org/globalreport/documents/20101123_GlobalReport_full_en.pdf)
- UNAIDS. (2012). *Together we will end AIDS*. UNAIDS Report on the Global AIDS epidemic. Retrieved from [http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120\\_UNAIDS\\_Global\\_Report\\_2012\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120_UNAIDS_Global_Report_2012_en.pdf)
- UNICEF. (2006). *Progress on children*. Report card on Nutrition. Retrieved from [http://www.unicef.org/progressforchildren/2006n4/index\\_breastfeeding.html](http://www.unicef.org/progressforchildren/2006n4/index_breastfeeding.html)
- Young, S. L., Mbuya, M. N., Chantry, C. J., Geubbels, E. P., Israel-Ballard, K., Cohan, D., & Latham, M. C. (2011). Current knowledge and future research on infant feeding in the context of HIV: Basic, clinical, behavioral, and programmatic perspectives. *Advances in Nutrition*, 2, 225–243.

## **CHAPTER 3.**

### **Breastfeeding Self-efficacy: A Critical Review of Available Instruments**

#### **Included with Permission from:**

Tuthill, E., McGrath, J., Graber, M., Cusson, R., & Young, S. (2015). Breastfeeding self-efficacy: A critical review of available instruments. *Journal of Human Lactation*, 1-11. Sage Publication©

# Breastfeeding Self-efficacy: A Critical Review of Available Instruments

Journal of Human Lactation

1-11

© The Author(s) 2015

Reprints and permissions:

sagepub.com/journalsPermissions.nav

DOI: 10.1177/0890334415599533

jhl.sagepub.com



Emily L. Tuthill, MS, RN<sup>1,2</sup>, Jacqueline M. McGrath, PhD, RN, FNAP, FAAN<sup>1</sup>,  
Melanie Graber<sup>3</sup>, Regina M. Cusson, PhD, NNP-BC, APRN, FAAN<sup>1</sup>,  
and Sera L. Young, MA, PhD<sup>3</sup>

## Abstract

Increasing breastfeeding rates in the United States is a national priority. Yet, initiation and duration of breastfeeding remains below national targets. Breastfeeding self-efficacy has been shown to be a strong predictor of both breastfeeding initiation and duration and is therefore an important characteristic to be able to measure. However, there is currently a myriad of instruments for measuring breastfeeding self-efficacy, which makes selection of an appropriate instrument difficult. Thus, our aim was to identify, compare, and critically review available breastfeeding self-efficacy instruments. In a systematic review, 6 breastfeeding self-efficacy instruments were identified. The instruments' purposes, theoretical framework, final scale development, and application in 5 most recent settings were analyzed. The 6 breastfeeding self-efficacy instruments apply a number of theoretical and conceptual frameworks in their development, with Bandura's social cognitive theory being most common. Content, construct, and predictive validity were strong for most scales. Some, but not all, have been successfully adapted to novel settings. In sum, there are several measurements of breastfeeding self-efficacy that can and should be employed to better understand reasons for suboptimal breastfeeding rates and the effects of interventions on breastfeeding self-efficacy. Instrument selection should be based on domains of primary interest, time available, peripartum timing, and assessment of previous adaptations. Failure to apply appropriate measures in research may garner results that are inconclusive, inaccurate, or nonrepresentative of true study effects.

## Keywords

affective instruments, breastfeeding, human milk, instruments, measurement, psychometric testing, review, self-efficacy, survey

## Background

Human milk provides optimal infant nutrition and has short- and long-term health benefits for both infants and mothers.<sup>1</sup> As such, the World Health Organization and American Academy of Pediatrics recommend exclusive breastfeeding (EBF) (ie, feeding only human milk, including expressed milk and medicines and no other fluids or foods) for the first 6 months of the infant's life, with continued breastfeeding for at least 1<sup>2</sup> or 2<sup>1,3</sup> years.

Breastfeeding practices in the United States (US) are sub-optimal. The US surgeon general issued a call to action in 2011 with initiatives reflected in Healthy People 2020, which aimed to increase US breastfeeding rates for having ever breastfed and EBF to 6 months to 81.9% and 25.5%, respectively.<sup>4</sup> In 2013, the prevalence of breastfeeding at 6 months was 49%, up slightly from 41.5% in 2007.<sup>3</sup> Similarly, EBF rates in the US increased to 16.4% in 2007 from 11.3%.<sup>4</sup> However, if the breastfeeding goals set out by the US surgeon general are to be met, a better understanding of the numerous barriers to breastfeeding is needed.

Indeed, there are many determinants of breastfeeding behaviors from the level of the society, to the community, the household, and the individual.<sup>5</sup> At the level of the individual, affective characteristics, or the "qualities which represent people's typical ways of feeling," have been shown to be particularly important determinants of breastfeeding practices.<sup>6</sup>

Self-efficacy, or "one's belief in one's ability to succeed in a specific situation,"<sup>7</sup> is 1 such affective characteristic and is 1 of the strongest predictors of a range of behaviors,

<sup>1</sup>University of Connecticut School of Nursing, Storrs, CT, USA

<sup>2</sup>Center for Health Intervention and Prevention, University of Connecticut, Storrs, CT, USA

<sup>3</sup>Division of Nutritional Sciences and Department of Population Medicine and Diagnostic Sciences, Cornell University, Ithaca, NY, USA

Date submitted: October 20, 2014; Date accepted: July 9, 2015.

## Corresponding Author:

Emily L. Tuthill, MS, RN, UConn School of Nursing, 231 Glenbrook Road, Storrs, CT 06268, USA.

Email: emily.tuthill@uconn.edu

including breastfeeding.<sup>5</sup> As such, the ability to appropriately measure self-efficacy is useful for predicting both breastfeeding initiation and breastfeeding behavior over time. This review aims to make the measurement of breastfeeding self-efficacy more readily achievable by providing a brief description, evaluating validity and adaptation, and then offering critical assessments of each instrument.

## Methods

We searched electronic databases, including PubMed, CINAHL, PsychINFO, Web of Science, Health and Psychosocial Instruments, and Cochrane, through March 2013. Unpublished reports, theses, dissertations, and studies not in English were not included in the analysis. Key search terms and their synonyms, including PubMed MeSH terms, were *breastfeeding*, *infant feeding*, *pregnant and postpartum women*, *self-efficacy*, *lactation*, *breast milk*, *affective measures*, *scales*, *human milk*, *instrument*, and *tools*. Any original empirical study measuring some aspect, either implicitly or overtly, of self-efficacy toward breastfeeding among pregnant and postpartum women was analyzed. There were no limitations placed on how instrument creators defined self-efficacy.

Seventy-two articles were initially identified. After abstract review, 64 were excluded because they described instruments pertaining to other affective constructs, such as knowledge, attitudes, and social support. Two more were excluded after full review for not measuring breastfeeding self-efficacy, leaving a total of 6 instruments.

In the Results, we first provide a brief overview of each instrument. Then, 3 types of validation are assessed. Because the purpose of validity is to ensure that data derived from the instrument provide meaningful and reliable results, it is arguably the most important consideration to instrument development.<sup>6</sup> *Content validity*, or the extent to which the items reflect the intended universe of content, was established by both literature review and expert judges.<sup>6</sup> Some developers chose to use a content validity index score to enhance their confidence in the content validity results. Content validity index scores have been used to provide some objective measure to the subjective assessment made by content experts.<sup>8</sup> *Construct validity* measures how well items capture their intended domain or construct by applying a factor analysis, which yields the number of derived factors (derived from the original domains) and a Cronbach alpha score indicating whether participants understood the items as the creator intended (ie, if the data are reliable).<sup>6</sup> A third type of validity is *predictive validity*, or the adequacy of an instrument in projecting a future behavior/outcome (ie, whether results from the breastfeeding self-efficacy instrument accurately forecast behavior on a future criterion, initiation, or duration).<sup>6</sup> Predictive validity is often reported descriptively, however, some studies may report results using correlations. This type of validity is useful in identifying women at risk for not breastfeeding as well as providing the researcher,

practitioner, or program managers with an indication of what to expect in order to tailor programs accordingly. In the third portion of the Results, we describe the adaptation of each tool in novel settings, using the 5 most recently published studies at the time of writing this manuscript.

## Results

### Overview of Breastfeeding Assessment Tools (Table 1)

**Breastfeeding Self-Efficacy Scale (BSES).** The BSES was published by Dennis and Faux<sup>9</sup> to measure postpartum mothers' breastfeeding self-efficacy, defined as "a mother's perceived ability to carry out breastfeeding." Bandura's Social Cognitive Theory guided the development of the BSES.<sup>7</sup> Dennis and Faux were interested in capturing 2 components to self-efficacy in postpartum women, including (1) one's belief that a behavior will produce a particular outcome and (2) one's conviction in one's ability to perform a specific behavior that results in the desired outcome.<sup>9</sup> The instrument has 33 items with a 5-point Likert-type scale, with responses from *not at all confident* (1) to *always confident* (5). As such, scores can range from 33 to 165.

**Breastfeeding Self-Efficacy Scale—Short Form.** In 2003, Dennis<sup>10</sup> revised the BSES from 33 to 14 items and renamed it the BSES-Short Form (BSES-SF). The theoretical framework is the same as the BSES and uses the same 5-point Likert-type scale with scores ranging from 14 to 70.

**H & H Lactation Scale.** Pamela Hill and Sharron Humenick published the H & H Lactation Scale in 1996 to use among postpartum women to measure indicators of perceived milk insufficiency. Applying their own conceptual framework of Insufficient Milk Supply<sup>11</sup> to capture determinants to breastfeeding, they developed a questionnaire that included 3 specific constructs, including infant satisfaction, maternal satisfaction, and maternal confidence (ie, self-efficacy toward breastfeeding). The scale consists of 30 items with a 7-point Likert-type scale, ranging from *strongly disagree* (1) to *strongly agree* (7), with scores ranging from 30 to 210.

**Breastfeeding Personal Efficacy Beliefs Inventory (BPEBI).** The Breastfeeding Personal Efficacy Beliefs Inventory was published by Cleveland and McCrone<sup>12</sup> in 2005 with the aim of assessing breastfeeding confidence to predict initiation and duration of breastfeeding to 12 months among pregnant women. This instrument was intended to fill a gap in breastfeeding self-efficacy instruments by identifying pregnant women at risk of not initiating breastfeeding, rather than measuring breastfeeding confidence after delivery.

Like the BSES and BSES-SF, this tool uses Bandura's<sup>7</sup> self-efficacy model as its theoretical framework. Unlike the other 5 instruments, the BPEBI uses a visual analog scale with "cannot do" on 1 end and "certain can do" on the other

**Table 1.** Overview of Breastfeeding Self-Efficacy Assessment Tools.

Tool and Reference	Site	Stated Purpose	No. of Items and Scoring	Meaning of Score Interpretation (Score Range)	Factor Derived	Theoretical Framework	Instrument Availability/ Permission
Breastfeeding Self-Efficacy Scale (BSES; Dennis & Faux, 1999) <sup>9</sup>	Canada	To assess levels of self-efficacy in postpartum women	32 items; 5-point Likert-type scale ( <i>not at all confident to always confident</i> )	Higher scores indicate greater levels of breastfeeding self-efficacy (33-164)	1. Technique 2. Intrapersonal thoughts 3. Support	Bandura's (1977) <sup>7</sup> social cognitive theory	Dr Dennis: cindy.lee.dennis@utoronto.ca
Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF; Dennis, 2003) <sup>10</sup>	Canada	To assess levels of self-efficacy in postpartum women; To identify women at risk of early breastfeeding cessation through predictive measures	14 items; 5-point Likert-type scale ( <i>not at all confident to always confident</i> )	Higher scores indicate greater levels of breastfeeding self-efficacy (14-70)	1. Technique 2. Intrapersonal thoughts 3. Support	Bandura's (1977) <sup>7</sup> social cognitive theory, informed by the BSES	Dr Dennis: cindy.lee.dennis@utoronto.ca
H & H Lactation Scale (Hill & Humenick, 1996) <sup>11</sup>	USA	To understand mother's perception of insufficient milk by measuring infant satisfaction, maternal satisfaction, and maternal confidence in postpartum women	30 items; 7-point Likert-type scale ( <i>strongly disagree to strongly agree</i> )	Higher scores indicate that the mother feels more positive (more confident) about her breastfeeding experience (30-120)	1. Maternal confidence/commitment to breastfeeding 2. Perceived infant satiety 3. Maternal-infant breastfeeding satisfaction	Insufficient milk supply conceptual framework (Hill & Humenick, 1996) <sup>11</sup>	Dr Hill: phill@uic.edu
Breastfeeding Personal Efficacy Beliefs Inventory (BPEBI; Cleveland & McCrone, 2005) <sup>12</sup>	USA	To assess levels of confidence prenatally in breastfeeding initiation and duration up to 1 year	24 items; visual analog scale ( <i>cannot do to certain can do</i> )	Higher scores indicate greater levels of self-efficacy (0%-100%)	Confidence to manage: 1. Duration 2. Technique 3. Motivation 4. Different environments 5. Possible challenges	Bandura's (1977) <sup>7</sup> social cognitive theory	Dr McCrone: smccrone@hsc.wvu.edu
Prenatal Breastfeeding Self-efficacy Scale (PBSES; Wells et al, 2006) <sup>13</sup>	USA	To assess prenatal self-efficacy	20 items; 5-point Likert-type scale ( <i>not at all sure to completely sure</i> )	Higher scores indicate greater levels of self-efficacy (20-100)	1. Skills and demands 2. Information 3. Breastfeeding in public 4. Social pressure	Bandura's (1977) <sup>7</sup> "definition of self-efficacy" was used to inform development of items	Dr Wells: kwells@cas.usf.edu
Infant Feeding Intentions scale (IFI scale; Nommsen-Rivers & Dewey, 2009) <sup>14</sup>	USA	To assess strength and duration of intention to exclusively breastfeed prenatally	5 items; 4-point Likert-type scale ( <i>very much agree to very much disagree</i> )	Items are multidirectional and scoring is an average of items with total range being 0 ( <i>no intention</i> ) to 16 ( <i>very strong intention</i> ). Higher intention is indicative of greater levels of self-efficacy (0-16).	Not discussed	Theory of planned behavior (Ajzen, 1991) <sup>15</sup> and Stages of Change for Breastfeeding model (Humphreys et al, 1998) <sup>16</sup>	Dr Nommsen-Rivers: laurie.nommsen-rivers@cchmc.org

and a score range of 0% to 100%, generated by calculating the mean of the participant's score for each item.

**Prenatal Breast-feeding Self-efficacy Scale.** The Prenatal Breast-feeding Self-efficacy Scale (PBSES) was published by Wells et al in 2006.<sup>13</sup> Similar to the BPEBI, the PBSES was created to assess women's perceived breastfeeding self-efficacy during pregnancy.<sup>13</sup> The BSES instrument is acknowledged by the authors as a strong tool, but they felt it lacked breadth in its ability to measure breastfeeding self-efficacy antenatally. Thus, using Bandura's Social Cognitive Theory,<sup>7</sup> they created the PBSES for use with pregnant women. The scale comprises 20 items with ranges on a 5-point Likert-type scale from *not at all sure* (1) to *completely sure* (5), with a range from 20 to 100.

**Infant Feeding Intentions scale.** The Infant Feeding Intentions (IFI) scale, published by Nommsen-Rivers and Dewey in 2009, was created to measure infant feeding intentions of pregnant women, specifically, intentions to exclusively breastfeed.<sup>14</sup> Like the PBSES and BPEBI, the IFI scale was intended for use during the prenatal period. The major difference between the PBSES and IFI scale is the underlying theories. Rather than applying Social Cognitive Theory, the IFI scale is grounded in the Theory of Planned Behavior and Theory of Reasoned Action, which posit that behavioral intentions are highly correlated with actual behavior.<sup>15</sup> The authors also applied tenets of the Stages of Change model, which comprises 5 phases from precontemplation to action to assess mothers' readiness to carry out her intentions.<sup>17</sup> These phases were likened to the 4-point Likert-type scale with *very much disagree* (1) (ie, precontemplation) to *very much agree* (4) (ie, action), with scores ranging from 0 to 16. A score of 0 represents strong intention to not breastfeed, whereas a score of 16 represents a strong intention to exclusively breastfeed up to 6 months.

### Validation of Breastfeeding Self-efficacy Instruments (Table 2)

**Breastfeeding Self-Efficacy Scale.** To establish content validity, Dennis and Faux calculated a content validity index score. To calculate this score, 3 measurement experts and 4 content experts reviewed the instrument. They rated each item on its relevance (ie, its fit and understandability for the target population) and clarity (ie, item readability) using a 4-point Likert-type scale. The overall content validity index score was .86, suggesting strong content validity. Construct validity was measured by administering the 40-item instrument to 23 mothers in-hospital who were breastfeeding. This yielded 3 derived factors and a Cronbach alpha of .95, indicating both strong reliability and that some items could be omitted while still preserving internal reliability.<sup>9</sup> The final 33-item instrument was then retested among 130 recently delivered, in-hospital breastfeeding mothers with a Cronbach alpha of .96. Predictive validity was not measured.

**Breastfeeding Self-Efficacy Scale—Short Form.** Content validity was not repeated for the BSES-SF version. The BSES-SF showed strong construct validity with a total Cronbach alpha of .94.<sup>10</sup> Predictive validity was tested by administering the instrument at 1 week postpartum and assessing exclusive breastfeeding at 4 and 8 weeks postpartum, yielding strong results indicating that behavior at 1 week is predictive of behavior at 4 and 8 weeks.

**H & H Lactation Scale.** The content validity of the H & H Lactation Scale was not assessed. Construct validity was tested extensively via home visits with 120 term mothers at weeks 1, 2, 3, 4, and 6 postpartum as well as via telephone at weeks 5, 8, 12, 16, and 20. The final scale resulted in 20 items with 3 derived factors and a Cronbach alpha score of .96. Findings supported predictive validity between each of the factors and reported breastfeeding practices. Satiety and satisfaction had the highest predictive validity scores. Thus, mothers with greater confidence in their infant's satiety and satisfaction were better equipped to overcome personal beliefs about milk insufficiency and therefore continue breastfeeding.

**Breastfeeding Personal Efficacy Beliefs Inventory.** Content validity was assessed by expert review. Three nurses with expertise in maternity care reviewed each item prior to pilot testing. Construct validity was completed by pilot testing among a convenience sample of 42 lactating women who also provided qualitative feedback on item relevance. Revisions were then made based on content expert feedback and pilot testing. The final 27-item scale was retested among 479 female students. Factor analysis of the instrument uncovered 5 factors: thought, affect (emotion), motivation, action, and environment.<sup>15</sup> The final version included 24 items with a Cronbach alpha of .89. Predictive validity was not specifically measured. Although results indicate that higher scores were correlated with EBF in the early weeks postpartum, actual breastfeeding behavior was not assessed. Therefore, despite strong results indicating high levels of confidence to initiate breastfeeding, the actual link between confidence to initiate and that individual's behavior postpartum was not addressed.

**Prenatal Breast-feeding Self-efficacy Scale.** Content validity was established by 2 experts rating each of the 20 items' relevance on a 4-point Likert-type scale. An overall content validity index score of .90 was reported. Construct validity was then tested among 279 pregnant women recruited from antenatal clinics in Atlanta, Georgia, which revealed 4 derived factors and a Cronbach alpha of .89. Predictive validity was not tested.

**Infant Feeding Intentions scale.** Content validity was established by eliciting feedback on the instrument's content and clarity from a sample of 88 women, and not by expert review. The high proportion of women who spoke Spanish only necessitated translation. Construct validity was then tested among English- and Spanish-speaking pregnant



**Table 2.** Validation Studies of Breastfeeding Self-Efficacy Assessment Tools.

Tool	Place of Validation	Population for Validation	Content Validity	Construct Validity	Predictive Validity	Reliability
Breastfeeding Self-Efficacy Scale (BSES; Dennis & Faux, 1999) <sup>9</sup>	Mid-sized Canadian city	130 in-hospital breastfeeding mothers	3 measurement experts and 4 content experts consulted; overall BSES content validity index score .86; 23 breastfeeding moms	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Tested at 6 weeks postpartum. The higher the BSES score, the more likely the mother was exclusively breastfeeding at 6 weeks postpartum.	Cronbach alpha = .96
Breastfeeding Self-Efficacy Scale–Short Form (BSES-SF; Dennis, 2003) <sup>10</sup>	Near Vancouver, British Columbia, Canada	491 postpartum mothers at 1 week; same mothers again at 4 weeks (n = 459) and 8 weeks (n = 389)	Not retested from BSES	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Tested at 1 week, with higher scores at 4 and 8 weeks indicating the mother is more likely to be exclusively breastfeeding	Cronbach alpha = .97
H & H Lactation Scale (Hill & Humenick, 1996) <sup>11</sup>	Western Illinois and Southeastern Wyoming, USA	Two convenience samples; 110 mothers of low birth weight and 120 mothers of healthy term infants	Not tested	Exploratory factor analysis with principal components analysis	Higher scores predict increased rates of breastfeeding, satisfaction, and infant satiety	Cronbach alpha = .96
Breastfeeding Personal Efficacy Beliefs Inventory (BPEBI; Cleveland & McCrone, 2005) <sup>12</sup>	West Virginia, USA	479 female students	2 maternity nursing faculty members, 1 advanced practice maternity nurse	Exploratory factor analysis with principal components analysis and eigenvalue > 1	Women who breastfed exclusively, were older, had more education, and had a sister who had breastfed had higher BPEBI scores in a multiple regression analysis.	Cronbach alpha = .89
Prenatal Breastfeeding Self-efficacy Scale (PBSES; Wells et al, 2006) <sup>13</sup>	Atlanta, Georgia, USA	279 pregnant women	Experts in the field of breastfeeding and self-efficacy; 2 raters rated each item on a 4-point Likert-type scale ( <i>not at all relevant to very relevant</i> )	A factor analysis was performed; maximum likelihood analysis with eigenvalue > 1	Not assessed	Cronbach alpha = .89
Infant Feeding Intentions scale (IFI scale; Nommsen-Rivers & Dewey, 2009) <sup>14</sup>	Sacramento, California, USA	177 women delivering at a regional hospital	Pilot study with 88 women attending the University of CA–Davis prenatal clinics; specific content validity testing not discussed	Analysis of variance comparing IFI scores among 3 groups; Cox model; Kaplan-Meier survival curves for duration of exclusive breastfeeding; factor analysis not discussed	Infant feeding intention based on high scores from the IFI scale correlated with duration of exclusive breastfeeding	Cronbach alpha = .90

women in Sacramento, California. One hundred seventy participants completed the survey at delivery and at 4 days, 6 weeks, and 6 months postpartum to assess actual behavior, with a Cronbach alpha reported at .90 (derived factors from a factor analysis were not discussed). Predictive validity was explored by assessing whether higher scores of the IFI scale were associated with greater likelihood of breastfeeding postpartum.

### *Application of Breastfeeding Self-efficacy Instruments in Other Studies (Table 3)*

**Breastfeeding Self-Efficacy Scale.** The BSES has been adapted and translated for use in Western Iran,<sup>18</sup> Australia,<sup>19,20</sup> China,<sup>21</sup> and Turkey,<sup>22</sup> with study results from the 5 most recent publications showing strong Cronbach alpha scores ranging from .83 to .93. The BSES has been used to evaluate programs and test intervention effects on self-efficacy<sup>18</sup> and to predict duration of breastfeeding.<sup>18,19</sup>

**Breastfeeding Self-Efficacy Scale—Short Form.** The BSES-SF has been used more often than any of the other breastfeeding self-efficacy instruments; more than 40 articles have been published using this instrument. In the 5 most recent publications, the Cronbach alpha scores ranged from .86 to .93. Similar to the BSES, the BSES-SF has been used worldwide<sup>23</sup> and translated to other languages, including Chinese,<sup>24</sup> Croatian,<sup>25</sup> Japanese,<sup>26</sup> and isiZulu.<sup>27</sup> The BSES-SF has also been used to investigate the relationships between breastfeeding determinants, such as self-efficacy and insufficient milk perceptions,<sup>26</sup> or mothers who are ill<sup>23</sup> and pattern and duration of breastfeeding.<sup>28</sup>

**H & H Lactation Scale.** We identified only 2 subsequent studies in which the H & H scale has been used, and in 1 study, only the items pertaining to maternal confidence were included.<sup>20</sup> Both studies, conducted in the United States, compared results from the H & H Lactation Scale with the results from the BSES or BSES-SF. Findings showed high correlations between perceived milk insufficiency (ie, H & H lactation results) and breastfeeding confidence (ie, BSES/BSES-SF) among antenatal and postpartum participants (eg,  $r = -.84$ ,  $P < .001$ , where higher scores on the H & H indicate greater perceived milk supply<sup>23</sup>).

**Breastfeeding Personal Efficacy Beliefs Inventory.** We found only 1 study that used the BPEBI. Results were reported in Japanese and the study was therefore excluded.<sup>29</sup>

**Prenatal Breast-feeding Self-efficacy Scale.** This scale has subsequently been used in Spain<sup>30</sup> and the United States.<sup>31</sup> Content, construct, and predictive validity were tested, yielding strong results with women antenatally.<sup>30</sup> Assessing breastfeeding behavior by mothers at discharge confirmed predictive validity, with higher scores on the PBSES correlating with exclusive breastfeeding.<sup>30</sup> The translated version

yielded a strong Cronbach alpha of .91.<sup>30</sup> Robinson and VandeVusse<sup>31</sup> conducted a sequential mixed methods study using the PBSES to better understand decision making about using formula or breastfeeding among an African American population in the Midwestern United States.

**Infant Feeding Intentions scale.** The IFI scale was used in 2 subsequent studies, both of which were conducted by its developers.<sup>32,33</sup> Their findings demonstrated its usefulness within a multiethnic setting (ie, Sacramento, California), where both English and Spanish are spoken, in showing a relationship between higher intentions and exclusive breastfeeding at 6 months. Subsequent studies were both conducted in the United States.

## **Discussion**

These results suggest that there are several key considerations when selecting an existing instrument. These include the theoretical framework, number of items, timing of administration, validity, and adaptability in new settings. Furthermore, careful consideration of each item to confirm its relevance in another setting is critical to both appropriate adaptation and ultimately meaningful conclusions from applying an existing instrument in other research applications.

### *Considerations When Selecting an Existing Instrument*

**Theoretical framework.** Although the aim of each instrument was to measure breastfeeding self-efficacy, their theoretical underpinnings differed (Table 1). However, the majority of instruments (ie, BSES, BSES-SF, PBSES, BPEBI) were directly or indirectly based on Bandura's social cognitive theory.

The applied theory and its clarity of explanation by instrument developers are important for understanding the foundation behind item development. The BSES, BSES-SF, and BPEBI went into great detail explaining their theoretical frameworks as they applied to their item development, whereas the PBSES item development was theoretically guided by Dennis and Faux and not fully discussed. The H & H Lactation Scale applied the insufficient milk supply conceptual framework and described this well, but failed to explain what theoretical framework guided development of their self-efficacy domain. Similarly, the IFI scale did not operationalize breastfeeding self-efficacy well; therefore, we cannot assume that one's strength of intention is a reflection of one's self-efficacy. Ultimately, understanding the theoretical framework underpinning item development can ensure that a match is made between measurement intentions and actuality.

**Validity.** Content and construct validity were well assessed for each of the 6 instruments (Table 2). Many of the instruments measured predictive validity. However, given that this



**Table 3.** Application of Breastfeeding Self-efficacy Tools in Novel Settings.<sup>a</sup>

Study Reference	Purpose of Study	Setting	Method of Adaptation, Translation, Cross-Cultural Equivalency, or Pretesting	Reliability Results
<b>Breastfeeding Self-Efficacy Scale</b>				
Kamran et al (2012) <sup>18</sup>	To assess the effectiveness of an educational program on breastfeeding self-efficacy; BSES used as a pre-post test	Lorestan Province, Western Iran	2 Persian linguistics experts and 2 professional translators translated; followed by back-translation by 2 "other persons"	Cronbach = .85
Baghurst et al (2007) <sup>19</sup>	To assess the BSES at 1 week postpartum to predict duration of breastfeeding; the authors also tested the BSES-SF	South Australia	No adaptation mentioned	Not mentioned; results in hazard ratios
Dai and Dennis (2003) <sup>21</sup>	To translate the BSES into Mandarin to ensure content and semantic equivalence; breastfeeding women were assessed at 4 and 8 weeks postpartum	Tianjin City, China	1 translator forward translated followed by 2 blinded lay bilinguals who then back-translated; 8 breastfeeding experts assessed cross-cultural equivalency; pretesting with 21 postpartum breastfeeding mothers	Cronbach = .93
Creedy et al (2003) <sup>20</sup>	To test the BSES with antenatal women and then at 1 week and 4 months postpartum to determine predictive validity	Brisbane, Australia	Instruments were not modified	Cronbach = .97
<b>Breastfeeding Self-Efficacy Scale—Short Form</b>				
Ekşioğlu and Ceber (2009) <sup>22</sup>	To translate the BSES into Turkish and assess its psychometric properties	Altındag district, Izmir, Turkey	Back-translation followed by content validity testing among 10 professionals who knew both languages	Cronbach = .92
Wheeler and Dennis (2013) <sup>23</sup>	To assess the BSES-SF among mothers of ill or preterm infants; assessed at 1 and 6 weeks post-infant discharge	Central Canada	The BSES-SF was modified for use with mothers of ill or preterm infants and assessed by 12 health care provider experts; pretesting with 10 mothers of ill or preterm infants	Cronbach = .88
Pavlic Bosnjak et al (2012) <sup>24</sup>	To translate and psychometrically assess the BSES-SF among women in Croatia; pretesting took place at discharge, 1 and 6 months	Croatia	2 bilingual experts translated the BSES-SF and back-translation was completed by 2 blinded lay bilingual experts; content experts consulted; several modifications made to instrument; pretested by 20 postpartum mothers	Cronbach = .86
Ip et al (2012) <sup>25</sup>	To translate and test the BSES-SF among mothers in Hong Kong, China	Hong Kong	First author translated and second author verified accuracy of translation; content validity index score obtained <sup>11</sup>	Cronbach = .95
Tuthill et al (2014) <sup>26</sup>	To cross-culturally adapt the BSES-SF for use in an intervention study among HIV+ women	South Africa	Multistep approach—content validity index score and content expert feedback followed by translation and back-translation and the committee approach to refine adaptation after translation	Not tested
Otsuka et al (2008) <sup>27</sup>	To investigate the relationship between maternal perceptions of milk insufficiency and breastfeeding confidence	Tokyo and Kusatus, Japan	Translation by mother and author and back-translation by 2 blinded bilingual lay persons	Cronbach = .95
McCarter-Spaulding and Gore (2009) <sup>28</sup>	To determine whether breastfeeding self-efficacy predicts duration and pattern of breastfeeding	New England, USA	No adaptations/modifications made; breastfeeding self-efficacy scores were highly predictive of breastfeeding behavior at 1 month postpartum (hazard ratio .97)	Not mentioned

(continued)

Table 3. (continued)

Study Reference	Purpose of Study	Setting	Method of Adaptation, Translation, Cross-Cultural Equivalency, or Pretesting	Reliability Results
H & H Lactation Scale Creedy et al (2003) <sup>20</sup>	To test the BSES with antenatal women and then at 1 week and 4 months postpartum to determine predictive validity and correlate results to the maternal confidence items on the H & H Lactation Scale	Brisbane, Australia	No adaptations/modifications made	Not mentioned
Wheeler and Dennis (2013) <sup>23</sup>	To provide evidence for construct validity when correlated with the BSES-SF at 8 weeks postpartum	Central Canada	No adaptations/modifications made	Cronbach = .87
Breastfeeding Personal Efficacy Beliefs Inventory Nakada (2008) <sup>29</sup>	To explore the factors related to breastfeeding continuation and to examine the relationship between self-efficacy and breastfeeding continuation (article in Japanese)	Japan	Translation	Not mentioned in abstract
Prenatal Breast-feeding Self-efficacy Scale Pineiro-Albero et al (2013) <sup>30</sup>	To translate and assess psychometric properties of the PBSES in Spanish	Spain	Translation by 2 bilingual translators; modifications made to the translated version in Spanish; 2 bilingual translators then back-translated; 5 pregnant women where then given the instrument to assess comprehensibility	Cronbach = .91
Robinson and VandeVusse (2011) <sup>31</sup>	Mixed method study: investigating prenatal breastfeeding self-efficacy and infant feeding decisions among African American women	Midwest, USA	No adaptations/modifications made	t test, regression, and odds ratio reported
Infant Feeding Intentions scale Nommsen-Rivers et al (2010) <sup>32</sup>	To examine the intra-ethnic validity of the IFI scale in a multiethnic group of English-Spanish speaking primiparae	California, USA	Originally developed in English and Spanish; no modifications made	Cronbach = .70-.85 depending on ethnic group (tested among 5 different groups)
Chantry et al (2011) <sup>33</sup>	To describe weight loss in a multiethnic population of first-born, breastfed infants	California, USA	No modifications/adaptations mentioned	Statistical tests run to determine relationship between weight loss and other moderators

Abbreviations: BSES, Breastfeeding Self-Efficacy Scale; BSES-SF, Breastfeeding Self-Efficacy Scale-Short Form; IFI, Infant Feeding Intentions; PBSES, Prenatal Breast-feeding Self-efficacy Scale.

<sup>a</sup>Several of the instruments have not been adapted for use in 5 subsequent studies and are reflected as such in the table.

validity is only described by instrument developers qualitatively, results cannot be compared across instruments to judge the value-added benefits that predictive validity can yield to research conclusions, future research, or programs. Conceptually, predictive validity is useful to identify an instrument's adequacy in illustrating the relationship between an intention or behavior and a future outcome. However, lack of standardized reporting makes predictive validity results challenging to judge and therefore less useful when comparing results across instruments or when evaluating instrument fit for use in a subsequent study.

**Participant burden.** Time needed to complete the instrument is an important consideration given the realities of participant fatigue. Although instrument developers did not specifically address the number of minutes needed to administer their instrument, the number of items provides an estimate (Table 1). The BSES-SF (14 items) and IFI scale (5 items) each have fewer than 20 items, whereas the other 4 instruments each have greater than 20 items. With only 5 items, the IFI scale is likely the shortest option for screening pregnant women during prenatal visits.

**Pre/postnatal administration.** The BPEPI, PBSES, and IFI scale were developed to measure breastfeeding self-efficacy prenatally, whereas the BSES, BSES-SF, and H & H Lactation Scale measure breastfeeding self-efficacy postpartum. The IFI scale has successfully shown higher breastfeeding intentions, resulting in greater levels of exclusive breastfeeding at 6 months, which speaks to its predictive validity and may be useful for researchers assessing behavior. However, because none of the instruments can be used to measure prenatal and postnatal self-efficacy over time, especially between anticipated self-efficacy and experience self-efficacy, this is 1 area in which scale development could benefit. Specifically, capturing both constructs in 1 measure may be useful in determining the effectiveness of interventions and programs on levels of self-efficacy longitudinally.

**Cross-cultural adaptation.** Each of the 6 instruments was developed and first tested in the US or Canada (Table 1). Subsequent use of the instruments spans a range of cultures and ethnicities (Table 3). However, such adaptation mostly involved translation. A detailed cross-cultural adaptation process was not always reported. Cross-cultural adaptation is an in-depth process<sup>34</sup> that ensures that item meaning is maintained from the original to the target language and culture version. This may require item revision to accurately convey the connotative meaning intended behind each item. Additional testing may be warranted to effectively achieve cross-cultural adaptation, such as formative work with the target population that expounds upon content validity based on expert review to fully capture item understanding by the target population. However, it may be that when adapting

instruments for use in settings far different from the original instrument development, even when rigorous cross-cultural adaptation occurs, meaningful results fall short.

The following are next steps for using existing instruments to measure determinants of breastfeeding self-efficacy.

### Considerations When Using Existing Instruments in Research

When considering using existing instruments in research, a critical review of each item included in the instrument is important to ensure its relevance for the target population. Certain word choices or circumstances may be *inappropriate* for use in settings different from the original participant population. For example, an item in the BSES stating, "I can use a breast pump to obtain milk," may not be relevant among a population of women without access to breast pumps.

The *clarity* of items is also important to be confident in the meaning of responses by participants. The BSES-SF asks about the statement, "I can always be satisfied with my breastfeeding experience." This item could have many different interpretations and may be confusing to answer. If an item is vague, it is questionable that meaningful conclusions can be made from it or that its response would accurately contribute to an overall self-efficacy score. Conversely, the IFI scale has 5 items and is very clear in capturing intentions and essentially perceived self-efficacy through their chronological items: "When my baby is 1-month old, I will be breastfeeding without using any formula or milk." However, this scale is limited in its scope as it is designed to assess intentions only.

The H & H uses reverse *scoring*, which is intended to promote critical thinking of each item; however, it may inadvertently result in participant misunderstanding. For example, "Even though I can breastfeed, I would rather not breastfeed." If a mother has high levels of maternal self-efficacy toward breastfeeding, she would answer "strongly disagree." However, this item takes more thought to work through and may create confusion for participants. In this way, reverse scoring can be problematic as it requires more time and higher level thinking to ensure accurate responses.

In addition, some items of the H & H targeting levels of maternal satisfaction and self-efficacy toward breastfeeding are potentially judgmental of the mother. For example, "I feel I had to give formula after breastfeeding to satisfy my baby." Depending on the woman's health or other circumstances, this may be true regardless of her level of self-efficacy. The item reads more like a judgment of her actions rather than a test of maternal self-efficacy.

The PBSES includes several items regarding comfort of breastfeeding around people (eg, "I can breast-feed my baby when my family or friends are with me"). This is a *relevant topic* for many women and may affect her level of breastfeeding self-efficacy. The PBSES thoroughly covered these

kinds of situations in their scale—more so than the other instruments measuring perceived or actual self-efficacy toward breastfeeding.

A further consideration is that instrument creators (Table 1) must be available to respond to requests to use their instrument, and whether the application would fit the instrument's intended use. Because instruments are typically not available publicly, permission from the authors must be obtained. Therefore, identifying in the instrument development manuscript how to secure permission would be helpful for researchers seeking to use an existing instrument. Furthermore, adapting instruments for use in other settings is essential to ensure meaningful results in a different cultural context and any modifications should be published in their adapted version.

## Conclusion

Breastfeeding self-efficacy affects breastfeeding initiation and duration and is therefore an important construct to measure. Breastfeeding self-efficacy should be measured in a transparent, consistent, and replicable way to continue advancing our collective knowledge of this construct and its effect on breastfeeding rates.

A real opportunity exists for researchers studying breastfeeding to use established tools and modify them for their particular need and population. Therefore, the strengths and weaknesses of each instrument need to be recognized to ensure effective and targeted adaptation prior to use in settings different from the original population for which it was created. As breastfeeding self-efficacy continues to be measured, articulating exactly how and why instruments are modified is imperative.

As national and international organizations increase efforts to improve breastfeeding practices worldwide, evaluation of such programs through measuring determinants of breastfeeding, including self-efficacy, will continue to be needed. Furthermore, adding to the body of knowledge by researchers continuing to refine and improve rather than redefine what may already, in part, exist is beneficial to all.

## Future Implications

A collaborative effort to increase breastfeeding self-efficacy knowledge through resource sharing and advancing previous work may result in fewer, but stronger, instruments that increase understanding of the etiology of breastfeeding decisions and how breastfeeding can be best supported.

## Acknowledgments

We are grateful to Stephanie Martin for valuable feedback on manuscript drafts and to Sarah Young at Mann Library for her help with literature searching.

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: E.L.T. and S.L.Y. were supported by Grant Numbers F31MH099990 and K01 MH098902, respectively, from the National Institute of Mental Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

## References

1. American Academy of Pediatrics. Breastfeeding initiatives. <http://www2.aap.org/breastfeeding/>. Accessed March 12, 2014.
2. World Health Organization. Exclusive breastfeeding for six months best for babies everywhere. [http://www.who.int/mediacentre/news/statements/2011/breastfeeding\\_20110115/en/](http://www.who.int/mediacentre/news/statements/2011/breastfeeding_20110115/en/). Accessed December 10, 2014.
3. Centers for Disease Control and Prevention. Breastfeeding report card. <http://www.cdc.gov/breastfeeding/data/reportcard.htm>. Published 2013. Accessed March 12, 2014.
4. Centers for Disease Control and Prevention. The surgeon general's call to action to support breastfeeding. <http://www.cdc.gov/breastfeeding/promotion/calltoaction.htm>. Published 2012. Accessed March 12, 2014.
5. Labbok MH. Breastfeeding: population-based perspectives. *Pediatr Clin North Am*. 2013;60(1):11-30.
6. McCoach DB, Gable RK, Madura JP. *Instrument Development in the Affective Domain*. New York, NY: Springer; 2013.
7. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev*. 1977;84(2):191-215.
8. Lynn MR. Determination and quantification of content validity. *Nurs Res*. 1986;35(6):382-386.
9. Dennis CL, Faux S. Development and psychometric testing of the Breastfeeding Self-Efficacy Scale. *Res Nurs Health*. 1999;22(5):399-409.
10. Dennis CL. The Breastfeeding Self-Efficacy Scale: psychometric assessment of the short form. *J Obstet Gynecol Neonatal Nurs*. 2003;32(6):734-744.
11. Hill PD, Humenick SS. Development of the H & H Lactation Scale. *Nurs Res*. 1996;45(3):136-140.
12. Cleveland AP, McCrone S. Development of the Breastfeeding Personal Efficacy Beliefs Inventory: a measure of women's confidence about breastfeeding. *J Nurs Meas*. 2005;13(2):115-127.
13. Wells KJ, Thompson NJ, Kloeblen-Tarver AS. Development and psychometric testing of the Prenatal Breast-feeding Self-efficacy Scale. *Am J Health Behav*. 2006;30(2):177-187.
14. Nommsen-Rivers LA, Dewey KG. Development and validation of the Infant Feeding Intentions scale. *Matern Child Health J*. 2009;13(3):334-342.
15. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;50(2):179-211.

16. Humphreys AS, Thompson NJ, Miner KR. Assessment of breastfeeding intention using the transtheoretical model and the theory of reasoned action. *Health Educ Res.* 1998;13(3):331-341. doi:10.1093/her/13.3.331.
17. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol.* 1983;51(3):390-395.
18. Kamran A, Shrifirad G, Mirkarimi SK, Farahani A. Effectiveness of breastfeeding education on the weight of child and self-efficacy of mothers. *J Educ Health Promot.* 2012;1(1):11.
19. Baghurst P, Pincombe J, Peat B, Henderson A, Reddin E, Antoniou G. Breast feeding self-efficacy and other determinants of the duration of breast feeding in a cohort of first-time mothers in Adelaide, Australia. *Midwifery.* 2007;23(4):382-391.
20. Creedy DK, Dennis CL, Blyth R, Moyle W, Pratt J, De Vries SM. Psychometric characteristics of the Breastfeeding Self-Efficacy Scale: data from an Australian sample. *Res Nurs Health.* 2003;26(2):143-152.
21. Dai X, Dennis CL. Translation and validation of the Breastfeeding Self-Efficacy Scale into Chinese. *J Midwifery Womens Health.* 2003;48(5):350-356.
22. Eksioglu AB, Ceber E. Translation and validation of the Breast-feeding Self-Efficacy Scale into Turkish. *Midwifery.* 2011;27(6):246-253.
23. Wheeler BJ, Dennis CL. Psychometric testing of the modified Breastfeeding Self-Efficacy Scale (short form) among mothers of ill or preterm infants. *J Obstet Gynecol Neonatal Nurs.* 2013;42(1):70-80.
24. Pavicic Bosnjak A, Rumboldt M, Stanojevic M, Dennis CL. Psychometric assessment of the Croatian version of the Breastfeeding Self-Efficacy Scale–Short Form. *J Hum Lact.* 2012;28(4):565-569.
25. Ip W, Yeung LS, Choi KC, Chair SY, Dennis CL. Translation and validation of the Hong Kong Chinese version of the Breastfeeding Self-Efficacy Scale–Short Form. *Res Nurs Health.* 2012;35(5):450-459.
26. Tuthill EL, Butler LM, McGrath JM, et al. Cross-cultural adaptation of instruments assessing breastfeeding determinants: a multi-step approach. *Int Breastfeed J.* 2014;9:16.
27. Otsuka K, Dennis CL, Tatsuoka H, Jimba M. The relationship between breastfeeding self-efficacy and perceived insufficient milk among Japanese mothers. *J Obstet Gynecol Neonatal Nurs.* 2008;37(5):546-555.
28. McCarter-Spaulding D, Gore R. Breastfeeding self-efficacy in women of African descent. *J Obstet Gynecol Neonatal Nurs.* 2009;38(2):230-243.
29. Nakada K. An analysis of maternal self-efficacy and breastfeeding continuation. *Journal of Japanese Academic Midwifery.* 2008;22:208-221.
30. Pineiro-Albero RM, Ramos-Pichardo JD, Oliver-Roig A, et al. The Spanish version of the Prenatal Breast-feeding Self-efficacy Scale: reliability and validity assessment. *Int J Nurs Stud.* 2013;50(10):1385-1390.
31. Robinson KM, VandeVusse L. African American women's infant feeding choices: prenatal breast-feeding self-efficacy and narratives from a black feminist perspective. *J Perinat Neonatal Nurs.* 2011;25(4):320-328.
32. Nommsen-Rivers LA, Chantry CJ, Cohen RJ, Dewey KG. Comfort with the idea of formula feeding helps explain ethnic disparity in breastfeeding intentions among expectant first-time mothers. *Breastfeed Med.* 2010;5(1):25-33.
33. Chantry CJ, Nommsen-Rivers LA, Pearson JM, Cohen RJ, Dewey KG. Excess weight loss in first-born breastfed newborns relates to maternal intrapartum fluid balance. *Pediatrics.* 2011;127(1):171-179.
34. Brislin RW. The wording and translation of research instruments. In: Lonner WJ, Berry JW, eds. *Field Methods in Cross-Cultural Research.* Thousand Oaks, CA: SAGE; 1986:64-137.

## **CHAPTER 4.**

### **Exclusive breastfeeding promotion among HIV-infected women in South Africa: A IMB-model based pilot intervention**



## Introduction

Health benefits from breastfeeding positively impact mothers and provide unparalleled benefit for their infants, including reductions in morbidity (Black et al., 2013; Stuebe & Schwarz, 2010; UK cohort study, 2015) and improved survival (Black et al., 2013). It has been estimated that breastfeeding has contributed to increased child survival - potentially preventing 800,000 infant deaths between 2010 and 2011 (Black et al., 2013). Currently, the World Health Organization (WHO) and UNICEF recommend breastfeeding initiation within the first hours after birth; exclusive breastfeeding (EBF; i.e., feeding only breastmilk and no other fluids or foods) for the first six months; and continued breastfeeding for up to two years or more (UNICEF, 2014). Globally, rates of *ever* breastfeed are high (UNICEF, 2015), however, only 39% of children less than six months old in resource-limited countries are EBF and just 58% of babies 20- to 23-months old receive continued breastfeeding (UNICEF, 2015). While positive steps forward have been noted, higher rates of EBF are needed to further expand its benefits.

### *Breastfeeding among women living with HIV*

EBF is also recommended for HIV-infected women living in resource-limited settings (WHO, 2010). In 2013, an estimated 1.5 million pregnant women were living with HIV globally, 90% of them live in sub-Saharan Africa. Moreover, HIV prevalence among South African pregnant women was 29.5%, constituting the epicenter of the epidemic (Department of Health South Africa, 2012). Infant feeding recommendations among HIV-infected women have continued to evolve since HIV was first discovered in breastmilk in the 1980's (Thiry et al., 1985; WHO, 2003; WHO, 2007, 2010). Among women on antiretroviral therapy (ART) current evidence shows EBF reduces the risk of HIV infection while increasing HIV-free infant survival compared to mixed-feeding (i.e., feeding breastmilk and other foods or fluids; Rollins et al., 2013). Specifically, ART coupled with EBF practice can reduce mother-to-child transmission of HIV from 45% to less than 5% (Coovadia et al., 2007). Given the benefits of breastfeeding and the negative consequences from mixed-feeding in resource-limited settings, the WHO recommends that all women living with HIV in resource-limited settings EBF their infants for the first 6 months of life (WHO, 2010). Despite these recommendations, in South Africa, EBF up

to 6 months is uncommon where only 8% of all women are EBF at six months (South Africa Department of Health, 2008; Tylleskar et al., 2011).

HIV stigma, HIV disclosure between partners, cultural norms surrounding breastfeeding, and previous infant feeding experiences are all reported challenges to adopting EBF (Chisenga, Siame, Baisley, Kasonka, & Filteau, 2011; Doherty et al., 2011; Leshabari, Blystad, & Moland, 2007; Tuthill et al., 2014). Increased efforts promoting EBF through media campaigns and initiatives at the clinic level have occurred. However, critical elements that affect levels of breastfeeding determinants, including breastfeeding information, motivation and behavioral skills using a theory-based intervention are lacking.

## Theoretical Framework

EBF promotion using the Information, Motivation, and Behavioral Skills (IMB) Model (Fisher & Fisher, 1992) is an innovative approach to increase EBF rates. Moreover, designing effective and sustainable interventions that increase EBF requires approaches that take psychosocial determinants of breastfeeding into account. This study used the IMB model (Fisher & Fisher, 1992, 1993), which has been effective in multiple settings and populations in changing diverse HIV risk behaviors, as its theoretical framework (Cornman et al., 2011; Fisher, Fisher & Shuper, 2014).

The IMB model targets information, motivation and behavioral skill factors that are conceptually and empirically related to HIV risk and preventative behaviors (see Figure 1; Fisher & Fisher, 1992). Thus, the IMB model links a set of causal relationships between critical, conceptually-based behavioral change constructs that can be applied in prevention interventions (Fisher & Fisher, 1992). The model has been tested in correlational and intervention research among diverse populations worldwide (Kiene et al., 2013; Fisher & Fisher, 2000; Fisher et al., 2014).

The IMB model has three main assumptions. First, individuals require accurate prevention information regarding the behavior change of focus (e.g., know that EBF reduces the risk of infant death due to diarrhea and other communicable diseases and that the risk of HIV transmission increases from mixed-feeding). Second, individuals must be motivated to engage in



the target health behavior (e.g., possess positive attitudes towards EBF, feel empowered to overcome associated stigma, and have crucial normative support for EBF practice). Third, with appropriate information and motivation, individuals will engage the behavioral skills (e.g., those skilled behaviors necessary to effectively practice EBF over time, even in challenging circumstances, which may include breastfeeding in public or among family, identifying and overcoming breast health issues or avoiding feeding their infant water or other foods and fluids) to achieve the target behavior (in this case, EBF). The IMB model applies a comprehensive approach to behavioral change by linking psychological determinants of breastfeeding rather than addressing each construct in isolation. In this way, through targeting and mitigating IMB deficits while acknowledging and enhancing IMB strengths, HIV-infected women living in South Africa may be better equipped to practice EBF.

Breastfeeding information (Thomas et al., 2014), breastfeeding motivation (Cox et al., 2015) and breastfeeding behavioral skills (i.e., possessing the *objective* skills to perform a behavior, and the *emotional* sense of self-efficacy concerning their use even in challenging situations; Wilhelm et al., 2008) have been tested in isolation and found to be modifiable predictors of breastfeeding practice. Thus, through enhancing women's information, motivation, and behavioral skills with respect to EBF in an intervention during the antenatal period, there is potential to impact rates and persistence of breastfeeding behavior. To effectively support EBF among HIV-infected women, applying the IMB model of health behavior change during the antenatal period constitutes an innovative approach.

We developed an IMB model-based pilot intervention and delivered it using motivational interviewing (MI) techniques that can be adopted by healthcare providers in the context of a busy clinic setting during an already scheduled antenatal visit. The purpose of our study was to determine the potential of applying the IMB model of health behavior change to promote EBF through a brief MI inspired one-on-one counseling session during the antenatal period. We hypothesized that mothers who were well-informed, motivated, and possessed the requisite behavioral skills would be more likely to initiate and maintain EBF compared to those who received only standard antenatal care.

## Methods

### Participants and Setting

Study participants were HIV-infected women who were in their third trimester (28-42 weeks) of pregnancy. This study was conducted at two comparable public health service clinics in the Sweetwaters and Edendale townships, each located outside Pietermaritzburg.

Pietermaritzburg, and its surrounding townships, has an estimated population of 500,000.

Informal and formal housing, high population density and high rates of unemployment characterize the townships. HIV prevalence in KwaZulu- Natal province is estimated at 16.9% (Human Resources Research Council, 2012) and the infant mortality rate in South Africa for children under 5 is estimated is 47 per 1000 live births (UNICEF, 2012).

### Study Design

The pilot intervention used a randomized controlled experimental design to compare standard prevention of mother to child transmission of HIV care to the IMB-model based intervention, which constituted an “enrichment” of standard of care. All participants received standard of care procedures, which typically included a brief presentation by a counselor or other healthcare provider to the group of pregnant women in the waiting room prior to any client being seen by the antenatal care staff. Content included prenatal and postnatal expectations, diet, delivery options and the promotion of EBF by all women, including those living with HIV.

### Participants

Study eligibility included: (a) being 18 years or older, (b) being a woman infected with HIV, (c) who was pregnant in her third trimester, (d) currently taking ART, and (d) planning on returning to the clinic for her infant’s 6-week immunization visit. Participants were followed up by one of our research assistants at six weeks post partum. Given that other fluids and foods are often introduced within the first three days after birth (David, 2008) and two to four weeks represents a vulnerable period for breastfeeding cessation among postpartum mothers (Dennis, 2002; Riordan, 2005), 6 weeks postpartum provides a useful snapshot of child feeding behavior during

the early infant feeding stages. In addition, attendance at the six-week immunization visit is high in South Africa (i.e., 98%; Horwood et al., 2009), which makes it a feasible opportunity to connect with mothers.

#### Sample size.

A target sample size of 68 eligible participants was planned (IMB intervention = 34, Control = 34) to detect a medium effect size based on 80% probability.

#### Ethical Considerations

The University of Connecticut Institutional Review Board and the Human Sciences Research Council Ethics Review Board approved the study protocol.

#### Measures

To measure our IMB constructs, participants completed a 41-item questionnaire comprised of the Iowa Infant Feeding Attitudes Scale (IIFAS; De la Mara et al., 1999), the Breastfeeding Self-Efficacy Short-Form (BSES-SF; Dennis, 2003) and supplemental items developed to fully capture our IMB constructs. In addition, participants answered three items on their infant feeding intentions at the pretest and 10 items on actual infant feeding behavior at the posttest. Behavioral items included follow up questions asking women when other foods or fluids were first introduced to verify actual behavior and account for response bias.

**IIFAS:** The IIFAS has been used extensively in breastfeeding studies and consists of 17 items using a 5-point Likert-type scale that can predict the choice of infant-feeding method as reflected by measures of behavioral intentions, and the actual feeding behavior and duration of behaviors. Reports show adequate predictive validity and internal consistency of the data ranging from a Cronbach's alpha of .79 to .86 (De La Mora et al., 1999; Sittlington et al., 2007).

**BSES-SF:** The BSES-SF is a refined version of the larger BSES and includes 14 items. The BSES-SF was developed to measure mothers' breastfeeding self-efficacy (i.e., their perceived ability to perform breastfeeding). The BSES-SF has been tested among breastfeeding

mothers antenatally and post-partum with results ranging in Cronbach alpha scores of .90 to .94 for the obtained data (Ho & McGrath, 2010).

**Additional item development rationale and process.** Additional item development was completed for two reasons; first, to fully capture our motivation construct and second, to ensure items spanned infant feeding content in the context of HIV. Specifically, the IIFAS and BSES-SF focus on infant feeding information, attitudes and self-efficacy. However, by only assessing information, attitudes and self-efficacy they fail to adequately measure motivation, which according to our conceptual model is comprised of attitudes and social normative support. Furthermore, social norms and attitudes in the context of HIV are unique (e.g., perceptions of community support for exclusive breastfeeding and stigma associated with it) and require a modified approach in items targeted to non HIV-infected women. Therefore, social norm items in the context of HIV were developed following item development techniques by McCoach, Gable & Madura (2013).

The IIFAS, BSES-SF and additional items comprise our compiled instrument measuring IMB breastfeeding constructs among HIV-infected women in South Africa. Baseline assessment also included infant feeding intention and follow up at 6-weeks postpartum assessed actual infant feeding behavior. Participants completed the compiled questionnaire in an interview with one of our female research assistants at baseline (i.e., third trimester antenatal visit) and follow up (i.e., 6-week post-partum). Cross-cultural adaptation, including translation and content validity to ensure item relevance among our target population was completed and published separately (i.e., Tuthill et al., 2014). Our IMB breastfeeding constructs measured through the compiled instrument are operationalized as the following:

#### *Exclusive Breastfeeding*

The WHO definition of exclusive breastfeeding was applied for this study and is defined as feeding an infant only breast milk- no other liquids or solids, including water (with the exception of medicines; WHO, 2015). Exclusive breastfeeding was explained to all participants prior to baseline and follow up interviews.

#### *Information*

Information items were based on factual content pertaining to breastfeeding and formula feeding such as breastmilk being nutritionally superior to formula. In addition, information item assessed knowledge of the health benefits breastfeeding offers over formula feeding.

### *Motivation*

Motivation is conceptualized as one's attitudes toward breastfeeding and their social normative support associated with a behavior (Fisher & Fisher, 1992). Therefore, to better understand baseline and 6 week postpartum levels of motivation to EBF we analyzed attitudes and social norms separately. Attitudes were operationalized as feelings toward exclusive breastfeeding behavior, including inconveniences and difficulties to EBF as well as feelings toward the role of the father surrounding exclusive breastfeeding practice. Community and family beliefs toward exclusive breastfeeding in general and in the context of HIV composed our items reflective of social normative support.

### *Behavioral Skills*

Behavioral skills were operationalized as one's perceived self-efficacy in her ability to perform the behavior (i.e., exclusive breastfeeding). Self-efficacy items were further operationalized by *objective* behavioral skills (e.g., confidence in identifying a plugged duct) and *emotional* self-efficacy (e.g., confidence in breastfeeding in a public place). *Emotional* self-efficacy is the confidence in one's ability to execute a behavior regardless of the circumstance. Breastfeeding in public requires self-confidence and the fortitude to overcome public perception of infant feeding and exemplifies *emotional* self-efficacy. A strong self-efficacy or one's perceived confidence to perform a behavior effectively is highly predictive of behavioral performance (Bandura, 1997).

### Motivational Interviewing Counseling Session

Our IMB-model based intervention was delivered using motivational interviewing (MI) techniques (Miller & Rollnick, 1991). MI uses an empirically tested counseling technique to deliver brief one-on-one counseling sessions with the aim of reducing ambivalence toward a behavior while acting as an effective means to convey Information, Motivation and Behavioral Skills content to HIV-infected populations to change high-risk behavior. Its four main principles, which are practiced by the counselor include; (1) express empathy by reflecting the client's

words back to them, (2) understand the values and beliefs of the client and clarify what the client considers important, (3) uncover reasons behind the clients feelings of ambivalence by remaining open to what they're expressing and, (4) support self-efficacy by highlighting the client's abilities and resources (Rollnick et al., 1991). MI is exceptionally relevant for increasing breastfeeding self-efficacy, which includes breastfeeding behavioral skills as it focuses on emphasizing personal choice and control (Rollnick et al., 2000). MI is also well positioned to impact levels of Information and Motivation by decreasing ambivalence in these areas. In effect, participants who feel uncertain or ambivalent toward EBF may have knowledge deficits about its benefits, perceive their family lacking support it or feel unmotivated to adopt EBF. Participants randomized to the pilot intervention group received the 45-minute, one-time, MI counseling session directly after completion of the baseline questionnaire. Current literature on challenges faced by women living with HIV in resource-limited settings, in addition to elicitation research conducted with our target population, were used in the development of the pilot intervention. The facilitator began each session by asking the participant how she was feeling about her pregnancy and decisions regarding infant feeding. MI techniques were used in the delivery of the pilot intervention, including reflection, and reducing ambivalence by clarifying IMB deficits as discussed by the participant. Specifically, the facilitator used active listening to reflect back to the client what they had shared. Reflecting statements back to the participant stimulated further discussion surrounding concerns, questions, and strategies to effectively initiate and maintain EBF practice.

#### Statistical Analysis

Chi-squared tests and t-tests were performed to analyze any differences at baseline between participants randomized to the IMB-model based intervention and standard of care control conditions. Independent and dependent t-tests were performed to measure any differences in IMB determinants between pre and post test and levels of actual exclusive breastfeeding. Cohen's d effect sizes for all t-tests were reported. Odds ratios were completed to investigate predictors of breastfeeding.

## Results

#### Participant Characteristics

A total of 68 participants were approached and enrolled in the study; 33 were randomized to our IMB-model based pilot intervention and 35 to the standard of care control condition. All participants completed the intervention and 85% completed the 6-week follow up assessment. Demographic characteristics are presented in Table 1. The average age of women was 28 years and the majority had some secondary education (98%). Most women (68%) reported being unemployed. Ninety-six percent of women reported having a boyfriend or partner and 36% reported living with their mother. At time of follow up all women reported receiving ART at their infant's time of birth and all infants received Nevirapine.

### Primary IMB Breastfeeding Outcomes

Regarding behavioral intention to EBF, at their third trimester antenatal appointment 87% of participants intended to EBF. At the 6-week post partum follow up 82% reported exclusively breastfeeding regardless of experimental condition; variability in our sample was lacking as the majority of women reported EBF at 6-weeks postpartum. Dependent samples *t*-tests were conducted to determine if there were significant changes in EBF Information, Motivation, and Behavioral Skills determinants from pretest to post-test within conditions (See Table 2). For those in the intervention condition, there were no pre- post-test significant differences in any of the IMB determinants (Information  $p=0.223$ ; Motivation (attitudes  $p=0.491$ , social norms  $p=0.809$ ); Behavioral skills  $p=0.707$ ). Additionally, for those in the standard of care control condition, there were also no pre-post-test significant differences in any of the IMB determinants (Information  $p=0.848$ ; Motivation (attitudes  $p=0.161$ , social norms  $p=0.154$ ); Behavioral skills  $p=0.080$ ). Independent *t*-tests were conducted to determine if any significant differences existed between the intervention and control conditions on IMB determinants at 6-weeks postpartum (See Table 3). Independent *t*-tests showed nonsignificant results in the change of IMB determinants by condition (Information  $p=0.458$ ; Motivation (attitudes  $p=0.846$ , social norms,  $p=0.266$ ); Behavioral skills,  $p=0.474$ ).

### Secondary Analyses

Because our intervention did not produce any differences in behavior or IMB behavioral determinants of EBF behavior, we investigated predictors of breastfeeding behavior to identify factors that may be influential (See Table 4). To better identify the factors driving exclusive breastfeeding, the behavioral skills construct that was measured using the BSES-SF was divided into two groups of items made up of objective behavioral skills (e.g., “I can always identify signs of breast health problems”) and items that we identify as *emotional* self-efficacy (e.g., “I can always successfully cope with EBF like I have other challenging tasks”). A bivariate regression showed breastfeeding *emotional* self-efficacy was significantly predictive of breastfeeding behavior (Unadjusted  $OR= 1.498$ ;  $p=0.016$ ). Attitudes toward breastfeeding predicted breastfeeding behaviors, however, it only trended on significance (Unadjusted  $OR=1.228$ ;  $p=0.080$ ). Information, social norms, and behavioral skills were not predictive of behavior. A multivariate regression was run to determine the individual influence of attitudes and breastfeeding self-efficacy on predicting breastfeeding behavior. When accounting for the variance of attitudes toward breastfeeding, *emotional* self-efficacy still remained a significant predictor of EBF (Adjusted  $OR=1.425$ ;  $p=0.045$ ).

## Discussion

Designing effective and sustainable interventions that result in increases in EBF requires approaches that take psychosocial determinants into account. In this study, we investigated whether our pilot IMB model-based intervention increased breastfeeding determinants and behavior *per se* more than receiving standard of care alone. Our results showed no difference between conditions, perhaps due to several limitations, including positive relationships between our research assistants and participants potentiating a possible social desirability limitation, and weaknesses in our compiled instrument. However, secondary analyses found *emotional* breastfeeding self-efficacy to be predictive of breastfeeding initiation and duration behaviors. IMB-model based intervention

Given the lack of variability in responses our ability to understand the true effect of our intervention is limited. Among a different population of women with more severe IMB deficits or lower levels of reported EBF, our IMB model-based pilot intervention may have proven



effective. However, there may have been additional factors influencing our results among our participant population.

Coinciding with the delivery of our intervention, the KwaZulu-Natal Department of Health deployed an initiative promoting EBF in public clinics outside Pietermaritzburg, including both study-site clinics. The initiative aimed to increase information about breastfeeding. It also provided reassurance to pregnant women about EBF in the context of HIV, often by way of healthcare providers showcasing their success with decreasing rates of mother to child transmission of HIV within their clinic through the dual benefits of ART access to treatment and EBF practice. Many women expressed the belief to study staff that EBF was the best practice for their infant after receiving such assurances from clinic healthcare providers. Our study did not take into account these initiatives (as they were not in place at the outset of our study) nor do we know if other clinics in the area are also seeing equally high EBF rates. In these morning sessions, pregnant women received information only (which by itself has been ineffective at changing behaviors in other behavioral change breastfeeding interventions; Meedya et al., 2010). However, it's possible, the attention to EBF may have led to an increase in its practice. Consequently, it may have also created an environment where women knew the recommended behavior and regardless of their actual infant feeding practices reported—due to social desirability-- what they knew to be the “right answer”.

Other factors contributing to our high EBF results, in addition to the Department of Health Initiative, may have been the positive and trustworthy relationships our research assistants formed with our participants. Such relationships may have resulted in a therapeutic dose among control participants resulting in no measurable EBF behavior or at least self-reports of EBF differences between groups. In addition, the high levels of self-efficacy among our participants may have impacted the correspondingly high numbers of breastfeeding initiation and duration to 6-weeks, which is reflective of assertions in the Social Cognitive Theory stating that strong self-efficacy toward a behavior is predictive of the likelihood in the successful execution of that behavior (Bandura, 1997).

The role of breastfeeding determinants

Our results showed *emotional* self-efficacy being predictive of initiation and duration of EBF among all participants regardless of condition. This result reinforces similar findings in the breastfeeding literature (Thomas et al., 2014; Wilhelm, et al., 2008). Individual self-efficacy items that significantly predicted breastfeeding behavior reflected one's confidence in breastfeeding in public or around family members, being able to avoid using formula, or one's ability to adapt to any breastfeeding situation. These items illustrate different situations that may derail breastfeeding behavior in women with low levels of self-efficacy.

In addition to self-efficacy, other research illustrates breastfeeding knowledge as a critical determinant to successful behavioral adaption (Hector et al., 2005), but as an isolated construct fails to influence initiation or duration (Meedya et al., 2010). Utilizing the comprehensive approach of the IMB model accounts for this concern.

Despite our pilot intervention failing to show motivation impacting breastfeeding behavior, previous research supports its influence (Meedya et al., 2010). However, positive attitudes towards breastfeeding by the mother can be overturned should her family undermine its practice (Meedya et al., 2010). In the context of HIV, both professional support and social support from friends and family (or lack thereof) impact infant feeding practices among woman living with HIV via cultural stigma surrounding HIV, personal beliefs and disclosure of one's status to partner and family. Thus, breastfeeding information, motivation and behavioral skills account for important influential determinants impacting breastfeeding behavior.

Our finding, identifying strong levels of self-efficacy predicting breastfeeding initiation and duration, highlights the effect of self-efficacy on the success of executing and maintaining EBF behavior. Impacting *emotional* self-efficacy through supportive programs that focus on individual deficits and strategies to overcome them is critical to optimizing levels. Examples in the literature show information and attitudes positively impacting breastfeeding behavior (Meedya et al., 2010; Thomas et al., 2014). However, limitations in our study, discussed further below, may account for the failure to see the true impact of information and motivation determinants on breastfeeding behavior.

Limitations

Although our study had several strengths, limitations exist. The lack of variability in item responses limited our ability to evaluate the true impact of IMB breastfeeding determinants on EBF practice. This may be due, in part, to a lack of relevance or comprehension in our instrument despite extensive cultural adaptation procedures (see Tuthill et al., 2014b). Furthermore, a response bias (i.e., participants self-reporting a behavior they believe to be what the researcher is favoring regardless of whether they are practicing that behavior) may cause a falsely high EBF rate of 82% at 6 weeks postpartum among all our participants, which may be potentiated by the Department of Health Initiative promoting breastfeeding. In an article by Henriques (2015), they discuss mothers self-reports of EBF were overestimated compared to more objective information on behavior obtained by using deuterium dilution techniques (a biological test using deuterium to detect the presence of other fluids and/or fluids in the infants system). This may be a biological option for assessing EBF practice, however further investigation is needed to validate its efficacy and feasibility.

### **Implications and Future Work**

In January 2015, South Africa adopted Option B+, which places pregnant women diagnosed with HIV on lifelong ARV therapy independent of CD4 count (South Africa Department of Health Guidelines on MTCT, 2015). A concern with placing HIV-infected pregnant women on lifelong therapy is the level of treatment adherence that can be maintained (Ngarina et al., 2013). Treatment efficacy and access have improved greatly in South Africa, with 90% of pregnant women on effective ART during the antenatal period (UNAIDS, 2015; Hoffman et al., 2014). Retention in care throughout the postpartum period and beyond is fundamental to sustained treatment success (i.e., maintained viral suppression and HIV-free infant survival). Treatment adherence in the postpartum period is especially concerning given the number of barriers inherent during this intense period as a new mother. However, over 50% of HIV-infected women are disengaged in care by 6 months postpartum (Hoffman et al., 2015; Phillips et al., 2014). In the context of HIV, optimal infant health is contingent on high ARV adherence in tandem with breastfeeding exclusively. Future research that supports keeping HIV-infected mothers in care postpartum is critical to keeping infants and their mothers healthy.

Modifiable breastfeeding determinants, in addition to IMB deficits, including postpartum depression and food insecurity, also increase risk of treatment failure in postpartum women (Dewing et al., 2013; Hung et al., 2014). Among all postpartum women in South Africa approximately 30% have screened positive for postpartum depression (Hung et al., 2014). Postpartum depression can negatively impact breastfeeding exclusivity and duration and treatment adherence (Dias & Figueiredo, 2015; Machado et al., 2014), in part, from women feeling less motivated and having lower levels of self-efficacy when depressed (Nel & Kagee, 2012). In this way, future interventions that target modifiable determinants, including IMB, by applying theory-based programs stand to positively impact treatment adherence and EBF practice- both essential to optimal health for mothers and their infant's.

Our pilot IMB-model based intervention may positively impact IMB breastfeeding determinants, however we were unable to evaluate its true effect with our current population. Given our pilot intervention applies a comprehensive approach to impact 3 influential breastfeeding determinants during a time when breastfeeding decisions are being made, it warrants further testing. In a recently published randomized control trial conducted in KwaZulu Natal (i.e., Tomlinson et al., 2014), with community health workers employing MI techniques in home visits postpartum, findings showed significant increases to EBF at 12 weeks postpartum. Future research applying our IMB-model based intervention as a package antenatal component to a postpartum program (e.g., Tomlinson et al., 2014), may prove useful to sustain EBF over time.

## **Conclusions**

Although our results reflected the majority of our participants EBF at 6 weeks postpartum, the challenges they face to execute this behavior can be overwhelming. Encouragingly, many mothers conveyed to our research assistants that they viewed breastfeeding as the more beneficial infant feeding option and ultimately want their infant to be healthy and HIV-free. Thus, how do we best support mothers living with HIV to execute the behavior they believe in and may even show the confidence to perform, yet EBF behavior at 12 weeks and beyond remains low (i.e., 8%)? Taking into account other modifiable determinants, such as postpartum depression and food insecurity, is central to improving overall adherence to EBF

practice. In addition, individual level interventions alone may not be enough to change what has become a predominantly mixed-feeding culture in South Africa. Consequently, community based interventions (e.g., Tomlinson et al., 2014) have shown some increases to EBF practice, particularly among HIV- negative women, indicating that HIV-infected women despite being informed and supported were not as likely to EBF. High levels of depression have been reported among all postpartum women in South Africa (Hung et al., 2014) and the link between depression and infant feeding has resulted in poor breastfeeding behaviors (Dennis & McQueen, 2009). New mothers living with HIV, in particular, face an overwhelming task to EBF while simultaneously navigating numerous other barriers potentially causing depressive symptoms or being compounded by them. The role of the mother today places them at risk of feeling isolated and alone given the task at hand. In the context of our participant population living in poor townships, with high unemployment, the stress and burden affiliated with caring for one's family is important to keep in mind when establishing supportive interventions.

Lastly, personal beliefs held by clinic and community health workers may impact counseling relationships with patients despite accurate information pertained during training. Personal experiences with infant feeding decisions made by female healthcare providers may inadvertently impact their level of support for current infant feeding guidelines. For example, an HIV-infected healthcare provider who used formula to feed her infant, as she may have had the resources to obtain it, may feel conflicted to recommend EBF (a different behavior than her own) to her patients (Koricho et al., 2010). Such infant feeding experiences and beliefs may require specialized training to address bias in order to provide objective and appropriate support to HIV-infected women so that they can adhere to evidence-based guidelines. Ultimately, EBF is a complex, multi-faced, social phenomenon that is practiced at the individual level, but influenced by family, community, policy-makers and healthcare providers. Sustaining EBF practice requires buy-in from key-stakeholders at every level of influence through multi-system, inter-disciplinary interventions.

## References

- Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall, pp.278.
- Bandura A. (1997). Self-efficacy, the exercise of control. New York: Freeman and Company.
- Black et al., (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet* 382; 427-51.
- Clouse K, Pettifor A, Shearer K, et al. (2013). Loss to follow-up before and after delivery among women testing HIV positive during pregnancy in Johannesburg, South Africa. *Trop Med Int Health*, 18:451–460.
- Cornman, D., Christie, S., Shepherd, L., MacDonald, S., Amico K., Smith L., Shuper, P., Adelaja, A., Mahlase, G., Frohlich, J., Pillay, S., Lalloo, U., Fisher, W., Fisher, JD. (2011). Counsellor-delivered HIV risk reduction intervention addresses safer sex barriers of people living with HIV in KwaZulu-Natal, South Africa. *Psychology and Health*, 26(12): 1623-41.
- David, S., Abbas-Chorfa, F., Vanhems, P., Vallin, B., Iwaz, J., & Ecochard, R. (2008). Promotion of WHO feeding recommendations: A model evaluating the effects on HIV-free survival in African children. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association*, 24(2), 140-149.  
doi:10.1177/0890334408315330
- De La Mora, A., Russell, D. W., Dungy, C. I., Losch, M., & Dusdieker, L. (1999). The Iowa Infant Feeding Attitude Scale: Analysis of reliability and validity. *Journal of Applied Social Psychology*, 29(11), 2362– 2380.
- Department of Health South Africa (1998) South African Demographic and Health Survey. <http://www.hst.org.za/publications/sa-demographic-and-health-survey> (accessed July 2015)
- Department of Health South Africa (2003). Demographic and Health Survey 2003.

Department of Health, South Africa, (2012) ' The National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa, 2011' - See more at: [http://www.avert.org/south-africa-hiv-aids-statistics.htm#footnote1\\_itea391](http://www.avert.org/south-africa-hiv-aids-statistics.htm#footnote1_itea391)

Dewing, S., Tomlinson, M., le Roux, I., Chopra, M., Tsai, A. (2013). Food insecurity and its association with co-occurring postnatal depression, hazardous drinking, and suicidality among women in peri-urban South Africa. *Journal of Affective Disorders* 150: 460-465.

Dennis, C. L. (2002). Breastfeeding initiation and duration: A 1990–2000 literature review. *Journal of Obstetric, Gynecologic and Neonatal Nursing*, 31(1), 12 – 32.

Dias. C., & Figueiredo, B. (2015). Breastfeeding and depression: A systematic review of the literature. *Journal of Affective Disorders* 171: 142-154.

DiClemente, R., Crosby, R., & Kegler. (2009). Emerging theories in health promotion practice and research. San Francisco, USA: Jossey-Bass.

Dodgson, J. E., Henly, S. J., Duckett, L., et al. (2003). Theory of planned behavior-based models for breastfeeding duration among Hong Kong mothers. *Nursing Research*, 52(3), 148–158.

Doherty T, Sanders D, Jackson D et al. (2012) Early cessation of breastfeeding amongst women in South Africa: an area needing urgent attention to improve child health. *BMC Pediatr* 12, 105.

Fishbein, M., & Middlestadt, S.E.(1989). Using the theory of reasoned action as a framework for understanding and changing AIDS-related behaviors. In V.M. Mays and G.W. Albee and S.M Schneider (eds.), *Primary prevention of psychopathology* (pp.93-110). Newbury Park, CA: Sage.

Fisher, J.D., & Fisher, W. A. (1992). Changing AIDS risk behavior. *Psychological Bulletin*, 111, 455-474.

Fisher, J. D., Fisher, W.A., & Shuper, P.A. (2009). The information-Motivation-Behavioral Skills model of HIV preventive behavior. In R.J. DiClemente, R.A. Crosby, & M.C. Kegler (Eds.). *Emerging theories in health promotion practice and research* (2<sup>nd</sup> ed. pp. 22-63). San Francisco, CA: Jossey- Bass.

- Fisher, W.A., & Fisher, J.D. (1993). A general social psychological model for changing AIDS risk behavior. In J. Pryor & G. Reeder (Eds.), *The social psychology of HIV infection* (pp. 127-153). Hillsdale, NJ: Erlbaum.
- Hector D, King L, Webb K, Heywood P. (2005). Factors affecting breastfeeding practice: applying a conceptual framework. *NSW Public Health Bulletin*, 16(3):52-5.
- Henriques, S. (2015). South Africa improves exclusive breastfeeding monitoring using nuclear technique. Retrieved from: <https://www.iaea.org/sites/default/files/561058111011.pdf>
- Hoffmann, C., Coh, S., Fildah, M., Hoffman, J., Mclleron, H., Denti, P., Haas, D., Dooley, K., Martinson, N., Chaisson, R. (2015). Treatment failure, drug resistance, and CD4T-cell count decline among postpartum women on antiretroviral therapy in South Africa. *JAIDS*. DOI: 10.1097/QAI.0000000000000811
- Ho, Y-J., McGrath, J. (2011). A Chinese version of Iowa Infant Feeding Attitude Scale: Reliability and validity assessment. *International Journal of Nursing Studies*, 48(4): 475-478.
- Horwood, C., Vermaak, K., Rollins, N., Haskins, L., Nkosi, P., & Qazi, S. (2009). Paediatric HIV management at primary care level: An evaluation of the integrated management of childhood illness (IMCI) guidelines for HIV. *BMC Pediatrics*, 9, 59. doi:10.1186/1471-2431-9-59
- Horwood, C., Voce, A., Vermaak, K., Rollins, N., & Qazi, S. (2010). Routine checks for HIV in children attending primary health care facilities in south africa: Attitudes of nurses and child caregivers. *Social Science & Medicine*, 70(2), 313-320. doi:10.1016/j.socscimed.2009.10.002
- Hung, K., Tomlinson, M., Roux, I., Dewing, S., Chopra, M., Tsai, A. (2014). Community-based prenatal screening for postpartum depression in a South African township. *International Journal of Gynecology & Obstetrics* 126(1): 74-77.
- Ijumba, P., Doherty, T., Jackson, D., Tomlinson, M., Sanders, D., Swanevelder, S., Persson, L. (2015). Effect of an integrated community-based package for maternal and newborn care



- on feeding patterns during the first 12 weeks of life: a clustered-randomized trial in a South African township. *Public Health Nutrition*: 1-9.
- Kiene, S., Fisher, W., Shuper, P., Cornman, D., Christie, S., MacDonald, S., Pillay, S., Mahlase, G., Fisher, J.D. (2013). Understanding HIV transmission risk behavior among HIV-infected South Africans receiving antiretroviral therapy: An Information-motivation-behavioral skills model analysis. *Health Psychology*, 32(8), 860-868.
- Koricho, A., Moland, K., & Blystad, A. (2010). Poisonous milk and sinful mothers: The changing meaning of breastfeeding in the wake of the HIV epidemic in Addis Ababa, Ethiopia. *International Breastfeeding Journal*, 5(1), 12.
- Lawson, K., & Tulloch, M. I. (1995). Breastfeeding duration: Prenatal intentions and postnatal practices. *Journal of Advanced Nursing*, 22, 841–849.
- Machado, M., Assis, K., Oliveira, F., Ribeiro, A., Araujo, R., Cury, A., Priore, S., Franceschini, S. (2014). Determinants of the exclusive breastfeeding abandonment: psychosocial factors. *Public Health Practice*, 48(6): 985-994.
- McCoach, D., Gable, R., Madura, J. Instrument development in the affective domain. New York: Springer 2013.
- Meedya, S., Fahy, K., Kable, A. (2010). Factors that positively influence breastfeeding duration to 6 months: A literature review. *Women and Birth*, 23: 135-145.
- Miller, W.R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behavior*. New York: Guilford Press.
- Nel, A., & Kagee, A. (2012). The relationship between depression, anxiety and medication adherence among patients receiving antiretroviral treatment in South Africa. *AIDS care* 25(8): 948-955.
- Ngarina, M., Popenoe, R., Kilewo, C., Biberfeld, G., Ekstrom, A. (2013) Reasons for poor adherence to antiretroviral therapy postnatally in HIV-1 infected women treated for their own health: experiences from the Mitra Plus study in Tanzania. *BMC Public Health* 13: 450

- Nor B, Ahlberg BM, Doherty T et al. (2012) Mother's perceptions and experiences of infant feeding within a community-based peer counselling intervention in South Africa. *Maternal Child Nutr* 8, 448–458.
- Phillips, T., Thebus, E., Bekker, L., McIntyre, J., Abrams, E., Myer, L. (2014). Disengagement of HIV- positive pregnant and postpartum women from antiretroviral therapy services: a cohort study. *Journal of International AIDS society* 17(1): 19242.
- Sittlington, J., Stewart, -Knox, B., Wright, M., Bradbury, I., Scott, J. (2007). Infant-feeding attitudes of expectant mothers in Northern Ireland. *Health Education Research* 22(4): 561-570.
- Stuebe AM, Schwarz EB. (2010). The risks and benefits of infant feeding practices for women and their children. *J Perinatal* 30:155–162.
- Republic of South Africa Department of Health (2003). Demographic and Health Survey 2003. Retrieved from: <https://dhsprogram.com/pubs/pdf/FR206/FR206.pdf>
- Republic of South Africa Department of Health. (2015). National consolidated guidelines for the prevention of mother to child transmission of HIV and the management of HIV in children, adolescents and adults. Retrieved from: <http://www.kznhealth.gov.za/family/HIV-Guidelines-Jan2015.pdf>
- Republic of South Africa Department of Health. (2014). National consolidated guidelines for the prevention of mother to child transmission of HIV and the management of HIV in children, adolescents and adults. Accessed Oct 13, 2015 [http://www.sahivsoc.org/upload/documents/HIV%20guidelines%20\\_Jan%202015.pdf](http://www.sahivsoc.org/upload/documents/HIV%20guidelines%20_Jan%202015.pdf)
- Riordan, J. (2005). Breastfeeding and human lactation. (3rd ed.). Sudbury (MA) Jones & Bartlett Publishers.
- Rollins, N., Ndirangu, J., Bland R. (2013). Exclusive breastfeeding, diarrhoeal morbidity and all-cause mortality in infants of HIV-infected and HIV uninfected mothers: an intervention cohort study in KwaZulu natal, South Africa. *PLoS One*, 8, e81307.
- Thomas, J., Yu, E., Tirmizi, N., Owais, A., Das, S., Rahman, S., Fauque A., Schwartz, B. (2015). Maternal knowledge, attitudes and self-efficacy in relation to intention to exclusively

- breastfeed among pregnant women in rural Bangladesh. *Maternal Child Health* 19(1): 47-57.
- Tomlinson, M., Doherty, T., Ijumba, P., Jackson, D., Lawn, J., Persson, L., Lombard, C., Sanders, D., Daviaud, E., Nkonki, L., Goga, A., Rohde, S., Sitrin, D., Colvin, M., Chopra, M. (2014). Goodstart: a cluster randomised effectiveness trial of an integrated, community-based package for maternal and newborn care, with prevention of mother to child transmission of HIV in a South African township. *Tropical Medicine and International Health*, 19(3): 256-266.
- Tuthill, EL., McGrath, J., Graber, M., Cusson, R., Young, SL. (2015). Breastfeeding self-efficacy: a critical review of available instruments. *Journal of Human Lactation*.
- Tuthill, E., McGrath, J. & Young, S. (2014). Commonalities and Differences in Infant Feeding attitudes and practices in the Context of HIV in Sub-Saharan Africa: a Metasynthesis. *AIDS Care*, 26(2): 214-225.
- Tuthill, EL., Butler, L., McGrath, J., Cusson, RM., Makiwane, G., Gable, R., Fisher, JD. (2014b). Cross-cultural adaptation of instruments assessing breastfeeding determinants: a multi-step approach. *International Breastfeeding Journal*, 9:16.
- Thiry, L., Sprecher-Goldberger, T., Jonckheer, T., Levy, J., Van De Perre P., Henrivaux, P., Clumeck, N.(1985). Isolation of AIDS virus from cell-free breastmilk of three healthy virus carriers. *The Lancet*, 326,891\_892.
- Tylleskar, T., Jackson, D., Meda, N., Engebretsen, I. M., Chopra, M., Diallo, A. H., PROMISE-EBF Study Group. (2011). Exclusive breastfeeding promotion by peer counsellors in sub-saharan africa (PROMISE-EBF): A cluster-randomised trial. *Lancet*, 378(9789), 420-427. doi:10.1016/S0140-6736(11)60738-1
- WHO. (2003). WHO/UNICEF/UNFPA/UNAIDS.HIV and infant feeding: guidelines for decision makers. (Reviewed) Geneva, Switzerland World Health Organization.
- WHO. (2007). HIV and infant feeding: New evidence and programmatic experience. Report of a technical consultation held in Geneva, Switzerland, 25-27 October, 2006. Geneva, Switzerland.

WHO. (2010). Guidelines on HIV and infant feeding. Retrieved from:

[http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf)

WHO/The Joint United Nations Programme on HIV/AIDS/United Nations Children's

Fund/United Nations Population Fund. (2008). HIV transmission through breastfeeding: A review of available evidence 2007 update. Geneva: Author.

WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of infant

mortality. Effect of breastfeeding on infant and child mortality due to infectious

diseases in less developed countries: a pooled analysis. *Lancet* 2000;

355(9202):451-455. <http://med-libinfo.bu.edu/ovidweb/ovidweb.cgi>. Accessed

3/2/01.

Wilhelm, S., Rodehorst, K., Stepan, M., Hertzog, M., Berens, C. 2008. Influence of intention

and self-efficacy levels on duration of breastfeeding for Midwest rural mothers. *Applied*

*Nursing Research 21: 123-130.*

UK Millennium Cohort Study. Retrieved from:

<http://www.cls.ioe.ac.uk/page.aspx?&sitesectionid=851&sitesectiontitle=Welcome+to+the+Millennium+Cohort+Study>

UNAIDS. (2014). South Africa. Retrieved Oct 13, 2015

<http://www.unaids.org/en/regionscountries/countries/southafrica>

UNAIDS. (2009). AIDS epidemic update. Retrieved from

[http://www.unaids.org/en/media/unaids/contentassets/dataimport/pub/report/2009/jc1700\\_epi\\_update\\_2009\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/dataimport/pub/report/2009/jc1700_epi_update_2009_en.pdf)

UNAIDS. (2010). UNAIDS Report on the Global AIDS Epidemic. Retrieved from

[http://www.unaids.org/globalreport/documents/20101123\\_GlobalReport\\_full\\_en.pdf](http://www.unaids.org/globalreport/documents/20101123_GlobalReport_full_en.pdf)

UNGASS. (2011). UN high level meeting on AIDS. New York. Retrieved from

<http://www.un.org/en/ga/aidsmeeting2011/>

UNICEF (2014) retrieved from [http://www.unicef.org/nutrition/index\\_24824.html](http://www.unicef.org/nutrition/index_24824.html)

UNICEF (2015). Accessed Oct. 15, 2015: [http://www.unicef.org/nutrition/index\\_24824.html](http://www.unicef.org/nutrition/index_24824.html)



Figure 1: IMB model of health behavior change (Fisher & Fisher, 1992)

Table 1: Participant characteristics by intervention and control conditions

		MI counseling session (n=33)		Control (n=35)		
Characteristic		<i>n</i>	%	<i>n</i>	%	<i>X</i> <sup>2</sup>
Highest level of Edu completed	Primary	0	0	1	2	4.195(p=0.123)
	Some Secondary	30	91	34	98	
	Post School	3	9	0	0	
Currently in school		8	24	5	14	1.089 (p=0.297)
	Unemployed	20	61	26	75	
	Employed	13	39	9	25	
Married	Full-time	4	12	3	8	1.452 (p=0.228)
	Boyfriend or living with as if married	31	93	34	97	
Lives with mother		11	33	14	40	0.325 (p=.0569)
Lives with partners mother		1	3	2	5	0.290(p=.0590)
Household Characteristics						
Drinking water	Piped water from yard	29	88	31	89	2.677 (p=0.613)
	Piped water from public tap	2	6	2	6	
	Tanker truck	0	0	1	2.5	
	Rainwater	1	3	0	0	
	Other	2	6	1	2.5	
Water treatment	No treatment	31	92	32	91	0.958 (p=0.619)
	Paraffin	0	0	0	0	
	Gas	2	6	2	6	
Cooking	Electric	31	94	29	83	5.346 (p=0.254)
	Wood	0	0	3	9	
	Pit latrin	19	58	17	49	
	Ventilated pit latrin	11	33	16	46	
	Inside flush toilet	2	6	1	2.5	
Toilet facility	Outside flush toilet	0	0	1	2.5	3.314 (p=0.507)
	Other	1	3	0	0	
Medical Characteristics						
Delivery location	Health Facility	28	85	28	80	2.343(p=0.504)
	On the way to a health facility	0	0	1	3	
	Outside a health facility	1	3	0	0	
	Other	4	12	6	17	
Attended post-partum		28	85	27	77	0.693 (p=0.707)
Received antenatal counseling		25	75	26	74	0.504 (p=0.777)
Currently on ART		29	87	29	82	2.675 (p=.102)
On ARTs at time of infant birth		29	87	29	82	.341 (p=.559)
ARVs given during delivery		14	42	14	40	0.410 (p=0.814)
Nevirapine given to infant at delivery		29	87	29	82	0.341 (p=0.559)
		<i>M (IQR)</i>	<i>SD</i>	<i>M(IQR)</i>	<i>SD</i>	<i>t</i>
Maternal Age		28.15 (25.7-33.8)	6.4 52	27 (25.5-33.2)	5.7 49	-0.739 (p=0.462)

Table 2. IMB determinants affecting exclusive breastfeeding at 6 weeks pre-post post-partum by intervention and control conditions

Intervention arm (n=29)		<u>dependent t-test</u>			
	preMean(SD)/postMean(SD)	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i> ( <i>SD</i> )
Information	24.48(1.9)/24.79(1.54)	1.246	28	0.223	0.23 (0.19)
Motivation					
Attitude	22.33(3.09)/22.65(3.54)	0.699	28	0.491	0.13(0.19)
Social Norms	10.57(1.92)/10.37(1.52)	-0.243	28	0.809	-0.05(0.19)
Behavioral skills	39.15(4.25)/38.48(6.29)	-00.380	28	0.707	-0.07(0.19)
Control arm (n=29)					
	preMean(SD)/post mean(SD)	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i> ( <i>SD</i> )
Information	24.45(1.44)/24.65(1.63)	0.193	28	0.848	0.04(0.19)
Motivation					
Attitude	22.37(2.4)/22.79(2.69)	1.440	28	0.161	0.26(.19)
Social Norms	10.02(1.46)/10.51(1.37)	1.465	28	0.154	0.27(0.19)
Behavioral skills	40.42(1.98)/38.82(4.55)	-1.816	28	0.080	-0.34(0.19)

Table 3. Change in IMB determinants by intervention versus control conditions

	<u>independent t-test</u>			
	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i> ( <i>SD</i> )
Information	0.748	56	0.458	0.19(0.26)
Motivation				
Attitude	-0.196	56	0.846	-0.05(0.26)
Social Norms	-1.123	56	0.266	-0.29(0.26)
Behavioral skills	0.721	56	0.474	0.19(0.26)



Table 4. Predictors of breastfeeding

<u>bivariate regression</u>			<u>multivariate regression</u>	
Unadjusted			Adjusted	
	OR (95%CI)	<i>p</i>	OR (95%CI)	<i>p</i>
InfoSum	1.276 (.857,1.9)	0.231		
Motivation				
AttitudeSum	1.228 (.976,1.544)	0.080	1.143 (1.120,2.202)	0.228
Social NormSum	1.190 (.821,1.722)	0.358		
Behavioral Skills				
Breastfeeding Skills	1.198 (1.023,1.471)	0.139		
Self-Efficacy Skills	1.498 (1.079,2.079)	0.016	1.425 (.843, 1.904)	0.045

## **CHAPTER 5.**

### **DISCUSSION**

## **Background**

An estimated 1.5 million pregnant women are living with human immunodeficiency virus (HIV) globally (UNAIDS, 2015). Ninety percent of these women live in sub-Saharan Africa (UNAIDS, 2015). South Africa accounts for the highest prevalence of HIV infections among women worldwide, with 29.5% of pregnant women being HIV-infected (South Africa Department of Health, 2012).

Since HIV was first discovered in breastmilk in the mid 1980's (Thiry et al., 1985), the World Health Organization's (WHO) infant feeding recommendations have evolved from the avoidance of breastmilk to practicing either exclusive formula feeding or exclusive breastfeeding based on individual choice (WHO, 2003, 2007). In 2010, the WHO updated its infant feeding guidelines to recommend that in resource-limited settings, all HIV-infected women exclusively breastfeed (EBF) their infants for the first 6 months (WHO, 2010). Although there is a slight risk of HIV transmission from mother to child through breastmilk, that risk decreases from 45% to less than 5% with EBF and antiretroviral (ARV) adherence (Coovadia et al., 2007). In addition, the failure to EBF results in mixed-feeding (providing other foods and fluids to one's infant before 6 months of age), resulting in increases to infant morbidity and mortality and a six-fold increase in mother to child transmission of HIV (Rollins et al., 2007). An increase in infant morbidity and mortality is associated with formula mixed with contaminated water mixed and/or suboptimal nutrition from multiple, insufficient infant feeding methods (Young, 2011).

Since the WHO update to infant feeding recommendations, Departments of Health (including the South African Department of Health) have revised national policy to promote EBF within public health clinics prevention of mother to child transmission of HIV programs (South Africa Department of Health, 2015). Despite such support, rates of EBF to 6 months in South Africa have remained low (i.e., approx. 8%; South Africa Department of Health, 2003).

This dissertation takes a closer look at infant feeding in the context of HIV among women living in resource-limited settings. Three projects were completed that investigate, 1) the challenges faced by HIV-infected women to EBF, 2) the existing tools measuring breastfeeding self-efficacy, a main predictor of breastfeeding behavior, and 3) an original study that explores

the effectiveness of a pilot intervention developed to support women overcome identified challenges to EBF. Together, these 3 studies provide a comprehensive overview of the complexities, modifiable risk factors and implications of infant feeding in the context of HIV. The studies in this dissertation offer researchers, healthcare providers, and program directors perspective on the barriers HIV-infected women face to infant feeding, what determinants influence breastfeeding behavior and how to leverage a theory-based support system to impact EBF by approaching women using collaborative, nonjudgmental, motivational techniques.

## **Discussion of Dissertation Findings**

### **Chapter 2.**

As evidenced from Chapter 2 findings (Tuthill, McGrath, & Young, 2014), women face overwhelming barriers to successfully EBF their infant. The risk of mother to child transmission of HIV through breastfeeding versus the greater risk of infant morbidity or mortality from formula or mixed-feeding left women feeling overwhelmed and isolated in their infant feeding experiences. Both healthcare providers and mothers expressed confusion regarding the change to infant feeding recommendations, potentiating mixed messages between healthcare providers and their patients. For some women this resulted in a lack of trust towards healthcare providers as well as mistrust in the recommendations themselves.

In 2015, HIV-infected women participating in our focus groups expressed the belief that EBF was the best practice, however struggled to execute the behavior. Main obstacles uncovered during focus group discussions mirrored those reported in chapter 2, and included, disclosure of HIV status to partner and family, family involvement in childcare and infant feeding and employment. Despite five years since the WHO update to infant feeding guidelines promoting EBF, rates remain low (e.g., approximately 8% EBF in South Africa at 6 months; SA DOH, 2003).

### **Chapter 3.**

Psychosocial determinants, including information, motivation and behavioral skills (i.e., self-efficacy) all positively influence breastfeeding initiation and duration (Cox et al., 2015; Ijumba et al., 2014; Thomas et al., 2014). Of these, self-efficacy is one of the most powerful

predictors of breastfeeding behavior (Wilhelm et. al., 2008). Breastfeeding self-efficacy (or ones confidence in their ability to execute breastfeeding) involves objective skills such as identifying a plugged duct or mastitis, to navigating situations such as breastfeeding in public or in front of family members. Public perceptions of breastfeeding (Amir, 2014) generate discomfort among women to breastfeed out of the home. To this end, in South Africa, where it can take most of a day to travel to the clinic for a well-child visit during which time an infant must be fed, a woman lacking breastfeeding self-efficacy may be derailed from her EBF practice. A strong sense of self-efficacy is needed to overcome breastfeeding in public and other barriers women face daily to EBF.

Impacting self-efficacy and other modifiable breastfeeding determinants requires effective instruments that capture meaningful and accurate results. Given the multitude of breastfeeding self-efficacy instruments available, Chapter 3 critically evaluated the instrument development methodology, validity and theoretical foundations in an in-depth discussion of each tool (i.e., Tuthill, Graber, McGrath, Cusson, & Young, 2015). Results from this review facilitated the identification of the most appropriate instrument to use in our pilot intervention study (Chapter 4).

To use our selected instrument in a setting different from the original population, cross-cultural adaptation took place. Briefly, in addition to forward and back translation from English to isiZulu, we recruited content experts in the field of breastfeeding, mother to child transmission of HIV and South Africa to assess the content of our compiled instrument. To garner more objective feedback on the relevance of our items, content experts also completed a content validity index score (Lynn, 1986). Items were left unchanged, revised or eliminated based on results from the content validity index score. For a more detailed description please refer to the published manuscript (i.e., Tuthill et al., 2014b).

#### **Chapter 4.**

Our pilot IMB-model based intervention constitutes an innovative approach to promote EBF among women living with HIV during the antenatal period. Despite our inability to evaluate its true effect, our pilot intervention offers a collaborative, patient-centered, one on one counseling session applying a comprehensive approach to impact 3 influential breastfeeding

determinants. Furthermore, working with HIV-infected women antenatally constitutes a *teachable moment* for women at a time when infant feeding decisions are being made. Several limitations (as discussed in detail in Ch. 4) may have potentiated our lack of significant findings. However, the potential of our IMB model based intervention to impact breastfeeding determinants and thus increase EBF rates is compelling and warrants further investigation.

In addition to our pilot intervention, there have been several interventions promoting EBF in resource-limited settings. However, unlike our relatively low-resource intensive intervention, others have utilized high- resource interventions (e.g., longitudinal studies, trained community health workers, multiple booster sessions) in their study designs (e.g., in Kenya; Okanda et al., 2014, India; Bhandari et al., 2005). Of these, PROMISE-EBF (Tylleskar et al., 2011) and Goodstart (Tomlinson et al., 2014) both applied randomized control trials to promote EBF in South Africa utilizing community-health workers and home visits at designated time points throughout the postpartum period. Goodstart (Tomlinson et al., 2014), which was conducted after PROMISE-EBF, incorporated home-visits immediately after birth whereas PROMISE-EBF introduced home-visits later in the first week. In addition, Goodstart applied Motivational Interviewing (MI) techniques to increase behavioral change. Increased EBF at 12 weeks to 29% (Tomlinson et al., 2014) was a significant and encouraging finding over Department of Health surveys showing EBF rates of 7% in 1998 and 8% in 2003 or PROMISE-EBF (Tylleskar's et al., 2011) results of 10% EBF at 12 weeks. The Goodstart intervention also showed a significant dose-response effect resulting in a 6% increase in EBF for every additional home visit, which illustrates the impact of multiple booster sessions during the postpartum period.

Our pilot intervention study is well positioned to potentially make a positive contribution as part of a packaged intervention promoting EBF during the prenatal and postpartum period. In the context of the South African Department of Health's current efforts to reach Millennium Development Goals 4 and 5 (UNGASS, 2011) to reduce child and maternal mortality, scale up of maternal and child health services by community health workers is underway (Chola et al., 2015). By applying a well-targeted, theoretically-based, individual counseling session using a well accepted and proven delivery technique (Tomlinson et al., 2014; Wilhelm et al., 2006), our

pilot intervention could be considered for inclusion as the prenatal component of the Department of Health initiatives or as packaged program with the Goodstart postpartum intervention.

The development of our pilot intervention was designed to fit into current constraints of a busy clinic setting. We acknowledged that an intervention at a prenatal time point only would have greater impact if accompanied by booster sessions during the postpartum period to reinforce behavioral maintenance, which has been shown in other IMB- based interventions (e.g., Fisher et al., 2014). However, given no existing intervention to our knowledge applying the IMB-model of health behavior change to promote EBF antenatally, we believed this was an important time point to reach women that could make a difference in EBF practice. Because even brief, one-time only, interventions that create a *teachable moment* can impact behavioral change (i.e., Kalichman et al., 2005), our pilot intervention represented an intervention dose at a critical time when breastfeeding decisions are being made (Lawson & Flocke, 2009; McBride, Emmons, & Lipkus, 2003; Miller & Rollnick, 1991). In addition, EBF requires women to execute this behavior as their first and only infant feeding practice, which requires effective antenatal planning. Thus constituting a teachable moment primed for the benefits an IMB-model based counseling session can leverage.

In addition, optimal infant health requires mothers to achieve high ARV adherence and to EBF. However, approximately 50% of HIV-infected women are disengaged from care within the postpartum period (Hoffman et al., 2015). Poor ARV adherence can result in multiple, negative repercussions, including drug resistance, greater disease burden and increased risk of vertical transmission of HIV (Hoffman et al., 2015). Consequently, modifiable risk factors, in addition to IMB, such as depression can impact medication adherence (Hoffman et al., 2015) and breastfeeding behavior (Dias & Figueiredo, 2015). Today, 30% of women screen positive for postpartum depression in South Africa (Hoffman et al., 2015). Future research targeting modifiable determinants, including depression, may have the dual benefits of increasing medication adherence and EBF- both critical components to maternal and infant health.

Future research using our IMB-model based intervention may benefit from several considerations including, 1) instrument evaluation for further adaption and validity testing, 2) incorporating booster sessions during the postpartum period (or consider packaging with existing

postpartum interventions; e.g., Goodstart), 3) evaluation of EBF behavior at later intervals, such as 12 weeks, 3 and 6 months, and 4) a sample size powered to see significant findings. A larger sample size, and improved instrument development with EBF evaluation at greater intervals may show our IMB-model based intervention is an effective support system among HIV-infected women.

### **Limitations**

Several overarching limitations in this trajectory of research are present. First, our self-reported rates of EBF at 6 weeks among all women (i.e., 82%) are very high. These rates may be actual behavior, however in light of results from several recent, well-funded and resourced intervention studies in South Africa reporting EBF at 12 weeks of 28% (Goodstart, 2014), and 10% (PROMISE-EBF, 2011), it seems improbable our effect would be that much greater. Consequently, such rates may reflect the result of social desirability potentiated from department of health initiatives promoting EBF at the time of our intervention implementation, or the strong relationships formed between our research assistants and participants.

A second limitation may have been the strength of our intervention. Findings from Ch. 2 and elicitation research conducted with our target population informed intervention development. However, it is possible our intervention is not sophisticated enough to meet the needs of our target population facing complex, multi-layered barriers that challenge their ability to execute a behavior that must be practiced exclusively. Future research is needed to evaluate our interventions strength and dose, considering the complexities and barriers that must be overcome to EBF for 6 months.

Finally, despite rigorous efforts to ensure cultural relevance in our compiled instrument, several limitations emerged during analysis. First, lack of variability in item responses made discerning meaningful results prohibitive. Lack of variability may have resulted from items failing to capture relevance among our participant population or items may have been too complicated and not well understood, resulting in participants answering, “strongly agree” to every item. Lessons learned from adapting existing instruments for our study point to the importance of formative work with members of the target population to ensure item



understandability, relevance and acceptance. Otherwise, a lack of confidence in the conclusions made from study findings can result. And in our case, despite critical review of available self-efficacy instruments (i.e., Chapter 2) and performing rigorous cross-cultural adaptation (i.e., Tuthill et al., 2014b) our compiled instrument represents a central major limitation.

## Conclusions

Many women reported to our research assistants the importance of keeping their babies healthy and HIV-free, and the knowledge that EBF is recommended. However, to practice breastfeeding exclusively for 6 months is a major undertaking. And current support systems remain ineffective at making a substantial impact on EBF rates.

In South Africa, the spread of HIV is largely due to heterosexual relationships (UNAIDS, 2015). Therefore confronting stigma, disclosure, and parental responsibility through the concept of *families living with HIV* is critical to sustainable EBF practice. Partners and families who are supportive of mothers in their infant feeding decisions, which may require overcoming cultural norms, will have more success in executing EBF (Meedya et al., 2015). In effect, EBF practice is more sustainable among women where disclosure and open communication with their partner has occurred (Leshabari et al., 2007; Tuthill et al., 2014).

Although targeting families is critical, multiple levels of influence must be addressed. Just as we cannot expect mothers to overcome the barriers to EBF in the context of HIV alone, how can we expect families to either? When stigma and judgment are present from other family members or the community, pressure to default in best practice behavior may be overpowering. Interventions not only need to improve a mother's IMB deficits through individual programs, but society must also support EBF in substantive ways. Many societies, including the US, have struggled to increase EBF rates despite more resources (CDC, 2014). Thus, the task of shifting societal attitudes that result in increases to EBF behavior require new and innovative approaches. One suggestion is to address the male-centric environment our beliefs, attitudes and behaviors are formed within by using a holistic approach to address infant feeding behavior. From the top tier of how societal leadership speaks out on infant feeding and HIV and the policies put in place to support them (e.g., financial support and maternity leave), to how employers support women

to breastfeed at the workplace, to community and peer support of breastfeeding, to the role of partners and families, and finally to the individual mother. Interdisciplinary, large-scale system interventions are needed to impact EBF rates and sustain its practice.

Together, these three dissertation studies contribute to our overall understanding of infant feeding in the context of HIV and the complexities driving infant feeding behavior. Ultimately, we can conclude that promoting EBF through interdisciplinary, multi-faceted, theoretically-based programs that take into account the challenges and complexities facing HIV-infected women is critical to sustaining its behavior. The IMB model provides a comprehensive approach to enhance influential breastfeeding determinants and is therefore a compelling foundation to base future work. Limitations of the IMB model are important to keep in mind, however. Mainly, and in context of the current study, the IMB model focuses on an individual level health behavior change. As discussed above, sustainable solutions that promote EBF and sustain its practice may require system changes, including at the family, community and national level. Although the IMB model was developed to target individual level change, applying it conceptually at the group level is possible. Extensive empirical work has supported the assumptions of the model (discussed in chapter 1), including population diversity (e.g., among University students; Fisher et al., 1994 to Indian male truck drivers; Bryan, Fisher & Benziger, 2001) and geographical range (e.g., South Africa; Fisher et al., 2014 to Atlanta, GA; Kalichman et al., 1999). Future research is needed to better understand the IMB model's effect on system based changes. Given its success at the individual level and the need for theory-based interventions at all levels, exploring this relationship may prove useful.

### **Implications for practice**

Our research program suggests the IMB-model applied to EBF promotion is an important conceptual foundation for future work supporting breastfeeding behavior. Healthcare providers play a pivotal role in the behaviors pregnant women adopt postpartum. Every successful intervention has relied on the role of healthcare providers, whether in a clinical or commuting setting. Ultimately, the better support and training provided to our healthcare providers, the greater potential for thorough and appropriate support of women in their efforts to EBF.

### **Implications for future research**

Pregnant women living with HIV in resource-limited settings must comprehend the life long commitment of a chronic disease, the upcoming birth of their baby and the cultural and social context into which he/she will be born- all of which can be overwhelming. However, this moment in time is relatively less overwhelming compared to the early days postpartum. The concept of creating a *teachable moment* between a healthcare provider and their patient can be aptly applied during the prenatal period when women are keyed into the momentous journey they're about to embark on and may be highly motivated to prepare for it. Thus, our brief IMB-model based pilot intervention aimed to target women during this vulnerable period may have the potential of impacting decision-making and initiation. Taking into account the recently published trial (i.e., Tomlinson et al., 2014) using motivational interviewing to improve maternal and child health, including to increase EBF, through home visits in the postpartum period, future research is needed to test a complete pre and postnatal theory-based intervention and is a promising fit for our IMB-model based intervention. Ultimately, future research that leverages the expertise and perspective from multiple disciplines to tackle the complex, multi-faceted phenomenon of breastfeeding at every level of influence is our best chance to sustainably impact EBF behavior.

## References

- Amir, I., 2014. Breastfeeding in public: “You can do it?” *International Breastfeeding Journal*; 9:187
- Bai, Y., Middlestadt, S., Peng, J., Fly, A. (2010). Predictors of continuation of exclusive breastfeeding for the first six months of life. *Journal of Human Lactation*, 26(1), 26-34.
- Bhandari N, Mazumder S, Bahl R, Martines J, Black R, Bhan M, et al. (2005). Use of multiple opportunities for improving feeding practices in under-twos within child health programmes. *Health Policy and Planning London School of Hygiene and Tropical Medicine*, 20(5):328—36.
- Chola, L., Pillay, Y., Barron, P., Tugendhaft, A., Kerber, K., Hofman, K. (2015). Cost and impact of scaling up interventions to save lives of mothers and children: taking South Africa closer to MDGs 4 and 5. *Global Health Action*, 8: 27265.
- Coovadia, H. M., Rollins, N. C., Bland, R. M., Little, K., Coutsoodis, A., Bennish, M. L., & Newell, M. L. (2007). Mother-to-child transmission of HIV-1 infection during exclusive breastfeeding in the first 6 months of life: An intervention cohort study. *Lancet*, 369(9567), 1107-1116. doi:10.1016/S0140-6736(07)60283-9
- Cox, K., Binns, C., Giglia, R. (2015). Predictors of breastfeeding duration for rural women in a high-income country: evidence from a cohort study. *Acta Paediatrica*, 104(8):350-9.
- Department of Health, South Africa, (2012) ' The National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa, 2011' - See more at: [http://www.avert.org/south-africa-hiv-aids-statistics.htm#footnote1\\_itea391](http://www.avert.org/south-africa-hiv-aids-statistics.htm#footnote1_itea391)
- Dias, C., & Figueiredo, B. (2015). Breastfeeding and depression: A systematic review of the literature. *Journal of Affective Disorders*, 171: 142-154.
- Fisher, J., Fisher, W., Williams, S., & Malloy, T. (1994). Empirical tests to an Information-Motivation-Behavioral Skills model of AIDS-preventive behavior with gay men and heterosexual university students. *Health Psychology*, 13(3), 238-250.

- Fisher, J., Fisher, W., Williams, S., & Malloy, T. (1996). Changing AIDS risk behavior: Effects of an intervention emphasizing AIDS risk reduction information, motivation, and behavioral skills in a college student population. *Health Psychology, 15*(2), 114-123.
- Ijumba, P., Doherty, T., Jackson, D., Tomlinson, M., Sanders, D., Swanevelder, S., Persson, L. (2015). Effect of an integrated community-based package for maternal and newborn care on feeding patterns during the first 12 weeks of life: a clustered-randomized trial in a South African township. *Public Health Nutrition: 1-9*.
- Iliff, P., Piwoz, E., Tavengwa, N., Zunguza, C., Marinda, E., Nathoo, L., Moulton, L., Ward, B., Humphrey, J: ZVITAMBO study group. (2005). Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival. *AIDS, 19*(7): 699-708.
- Kalichman, S., Williams, E & Nachimson, D. (1999). Brief behavioral skills building intervention for female controlled methods of STD- HIV prevention: Outcomes of a randomized clinical field trial. *Internal Journal of STC & AIDS, 10*(3), 174-181.
- Kalichman, S., Cain, D., Weinhardt, L., Benotsch, E., Presser, K., Zweben, A., Bjodstrup, B., Swain, G. (2005). Experimental components analysis of brief theory-based HIV/AIDS risk-reduction counseling for sexually transmitted infection patients. *Health Psychology, 24*(2):198-208.
- Lawson, P. & Flocke, S. (2009). Teachable moments for health behavior change: a concept analysis. *Patient Education Counseling, 76*(1): 25-30.
- Levy, J., Webb, L., & Sellen, D. (2010). “On our own, we can’t manage”: Experiences with infant feeding recommendations among Malawian mother living with HIV. *International Breastfeeding Journal, 5*: 15.
- Lynn MR. (1986). Determination and quantification of content validity. *Nursing research, 35*(6): 382–386.
- McBride, C., Emmons, K., Lipkus, I. (2003). Understanding the potential of teachable moments: the case of smoking cessation. *Health Education Research, 18*(2): 156-170.
- Miller, W.R., & Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behavior*. New York: Guilford Press.

- Okanda, J., Borkowf, C., Girde, S., Thomas, T., Lecher, S. (2014). Exclusive breastfeeding among women taking HAART for PMTCT for HIV-1 in the Kisumu Breastfeeding Study. *BMC Pediatrics*, 14: 280-288.
- Department of Health South Africa (2003). Demographic and Health Survey 2003. Retrieved from: <https://dhsprogram.com/pubs/pdf/FR206/FR206.pdf>
- South Africa Department of Health. (2015). National consolidated guidelines for the prevention of mother to child transmission of HIV and the management of HIV in children, adolescents and adults. Retrieved from: <http://www.kznhealth.gov.za/family/HIV-Guidelines-Jan2015.pdf>
- Thomas, J., Yu, E., Tirmizi, N., Owais, A., Das, S., Rahman, S., Fauque A., Schwartz, B. (2015). Maternal knowledge, attitudes and self-efficacy in relation to intention to exclusively breastfeed among pregnant women in rural Bangladesh. *Maternal Child Health* 19(1): 47-57.
- Tomlinson, M., Doherty, T., Ijumba, P., Jackson, D., Lawn, J., Persson, L., Lombard, C., Sanders, D., Daviaud, E., Nkonki, L., Goga, A., Rohde, S., Sitrin, D., Colvin, M., Chopra, M. (2014). Goodstart: a cluster randomised effectiveness trial of an integrated, community-based package for maternal and newborn care, with prevention of mother to child transmission of HIV in a South African township. *Tropical Medicine and International Health*, 19(3): 256-266.
- Tuthill, EL., McGrath, J., Graber, M., Cusson, R., Young, SL. (2015). Breastfeeding self-efficacy: a critical review of available instruments. *Journal of Human Lactation*.
- Tuthill, E., McGrath, J. & Young, S. (2014). Commonalities and Differences in Infant Feeding attitudes and practices in the Context of HIV in Sub-Saharan Africa: a Metasynthesis. *AIDS Care*, 26(2): 214-225.
- Tuthill, EL., Butler, L., McGrath, J., Cusson, RM., Makiwane, G., Gable, R., Fisher, JD. (2014b). Cross-cultural adaptation of instruments assessing breastfeeding determinants: a multi-step approach. *International Breastfeeding Journal*, 9:16.
- Tylleskar, T., Jackson, D., Meda, N., Engebretsen, I. M., Chopra, M., Diallo, A. H., PROMISE-EBF Study Group. (2011). Exclusive breastfeeding promotion by peer counsellors in sub-

- Saharan Africa (PROMISE-EBF): A cluster-randomised trial. *Lancet*, 378(9789), 420-427.  
doi:10.1016/S0140-6736(11)60738-1
- WHO. (2003). WHO/UNICEF/UNFPA/UNAIDS.HIV and infant feeding: guidelines for decision makers. (Reviewed) Geneva, Switzerland World Health Organization.
- WHO. (2007). HIV and infant feeding: New evidence and programmatic experience. Report of a technical consultation held in Geneva, Switzerland, 25-27 October, 2006. Geneva, Switzerland.
- WHO. (2010). Guidelines on HIV and infant feeding. Retrieved from:  
[http://whqlibdoc.who.int/publications/2010/9789241599535\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241599535_eng.pdf)
- Wilhelm, S., Rodehorst, T., Stepan, M., Hertzog, M., Berens, C. (2008). Influence of intention and self-efficacy levels on duration of breastfeeding for Midwest rural mothers. *Applied Nursing Research*, 21(2008): 123-130.
- UNAIDS. 2015 retrieved from  
[http://www.unaids.org/en/resources/documents/2015/GARPR\\_2015\\_guidelines](http://www.unaids.org/en/resources/documents/2015/GARPR_2015_guidelines). Accessed July 21, 2015